

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 15 Use 1				Soil Origin: TU-098A SFU			
Data attached and submitted by: Amy Mangel				Data Report Submittal Date: 02/09/2021			

Systematic Soil Sample Data: RSY 15 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU098A-001	1	Systematic	9,857	15,658	0.275	-0.00362	0.000630
HPPG-SFU-TU098A-002	2	Systematic	10,830	15,658	0.414	0.041	N/A
HPPG-SFU-TU098A-003	3	Systematic	11,115	15,658	0.345	0.027	N/A
HPPG-SFU-TU098A-004	4	Systematic	10,425	15,658	0.383	-0.0515	N/A
HPPG-SFU-TU098A-005	5	Systematic	10,808	15,658	0.274	-0.00939	N/A
HPPG-SFU-TU098A-006	6	Systematic	10,907	15,658	0.420	0.00564	N/A
HPPG-SFU-TU098A-007	7	Systematic	10,661	15,658	0.324	-0.00689	N/A
HPPG-SFU-TU098A-008	8	Systematic	10,673	15,658	0.461	-0.0404	N/A
HPPG-SFU-TU098A-009	9	Systematic	11,236	15,658	0.268	-0.0193	N/A
HPPG-SFU-TU098A-010	10	Systematic	10,660	15,658	0.335	-0.0253	N/A
HPPG-SFU-TU098A-011	11	Systematic	10,927	15,658	0.407	0.0196	0.0228
HPPG-SFU-TU098A-012	12	Systematic	11,187	15,658	0.440	-0.00395	N/A
HPPG-SFU-TU098A-013	13	Systematic	10,478	15,658	0.0819	0.0283	N/A
HPPG-SFU-TU098A-014	14	Systematic	11,303	15,658	0.350	0.00855	N/A
HPPG-SFU-TU098A-015	15	Systematic	11,251	15,658	0.321	-0.0957	N/A
HPPG-SFU-TU098A-016	16	Systematic	11,378	15,658	0.426	-0.00132	N/A
HPPG-SFU-TU098A-017	17	Systematic	12,057	15,658	0.422	0.00932	N/A
HPPG-SFU-TU098A-018	18	Systematic	10,216	15,658	0.378	-0.0202	N/A
HPPG-SFU-TU098A-019	19	Systematic	10,036	15,658	0.226	0.0144	N/A
HPPG-SFU-TU098A-020	20	Systematic	10,707	15,658	0.298	-0.0338	N/A
HPPG-SFU-TU098A-021	21	Systematic	10,414	15,658	0.452	-0.0426	-0.0506
HPPG-SFU-TU098A-022	22	Systematic	10,991	15,658	0.506	-0.0241	N/A
HPPG-SFU-TU098A-023	23	Systematic	10,088	15,658	0.281	0.000681	N/A
HPPG-SFU-TU098A-024	24	Systematic	10,541	15,658	0.397	-0.0139	N/A
HPPG-SFU-TU098A-025	25	Systematic	10,994	15,658	0.326	0.0273	N/A
Soil Systematic Sample Statistics					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)
					Maximum	0.506	0.0410
					Mean	0.3539	-0.0058
					Median	0.358	-0.00400
					Minimum	0.0819	-0.0515
					Standard Deviation	0.0905	0.0245
							N/A

Biased Soil Sample Data: RSY 15 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU098A-B-001	1	Biased	11,658	15,658	0.392	0.00178	-0.111

CPM Counts per minute

pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10202020-PG-ROV-204	10/20/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10212020-PG-JSS-206	10/21/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10212020-PG-JSS-208	10/21/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10222020-PG-JSS-214	10/22/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 15 Use 1
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 29 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 29 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-42. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 43-92). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 43-92). Samples HPPG-F-013 and HPPG-F-014 are field duplicates, correlating to systematic samples -003 and -017. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data. Systematic sample -015 was initially analyzed by the lab using a different measurement geometry. The sample was prepared into the correct measurement geometry and was separately re-analyzed (pages 77-92).
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 93-107). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
<b>Conclusions:</b>  In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.  RSY 15 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-098A SFU.  APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-098.

## Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-15-U1					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		1.00	25.06	12.68	13.02	3.60
ROI-06		47.09	124.28	86.96	87.17	10.74
ROI-07		31.06	102.23	67.04	67.13	9.11
ROI-08		69.14	157.32	110.21	110.23	11.85
ROI-10		1,818.77	2,656.90	2,290.16	2,301.94	113.14

Statistical Summary Reference Background

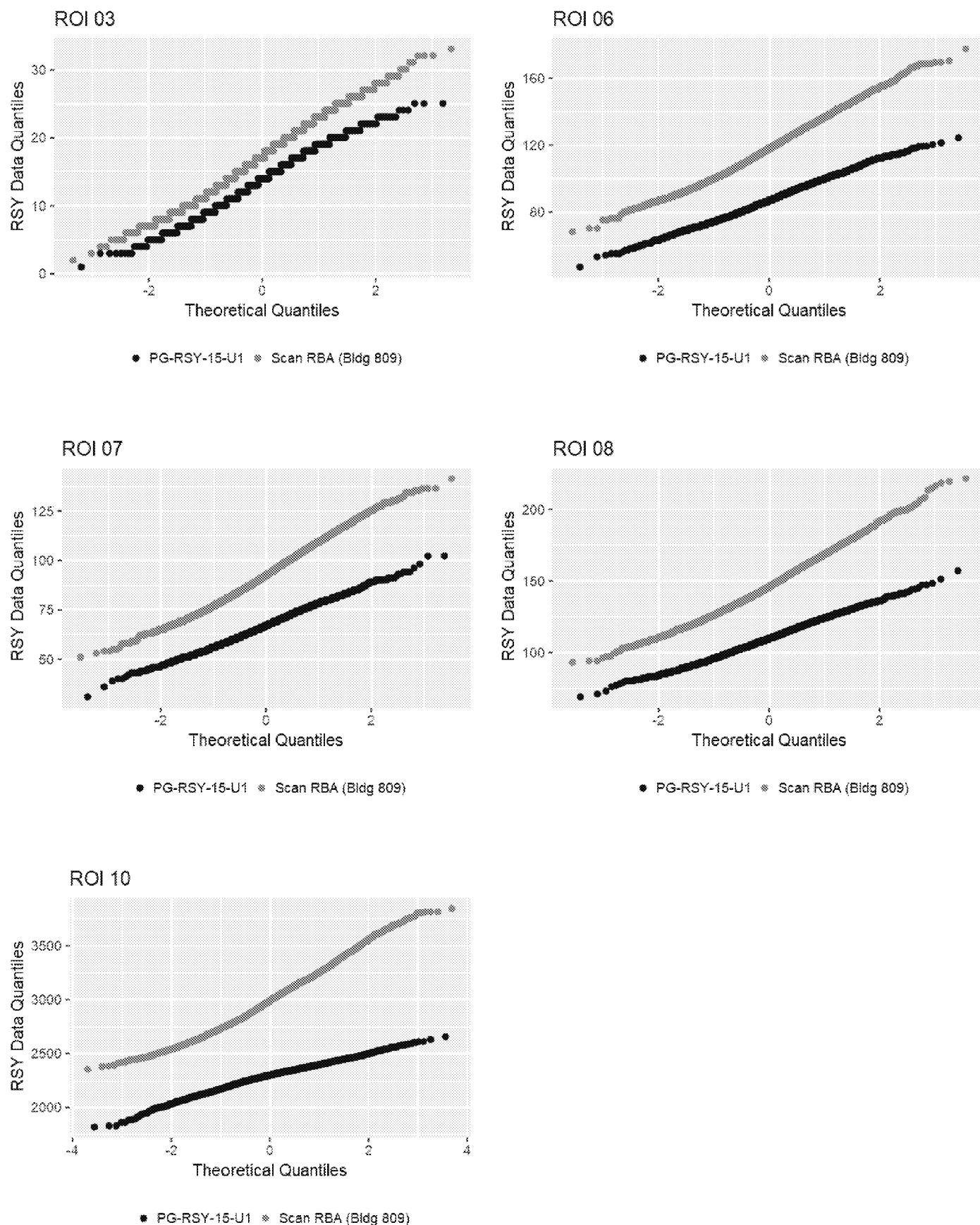
TYPE	Scan RBA (Bldg 809)					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-15-U1	2898
Scan RBA (Bldg 809)	4632

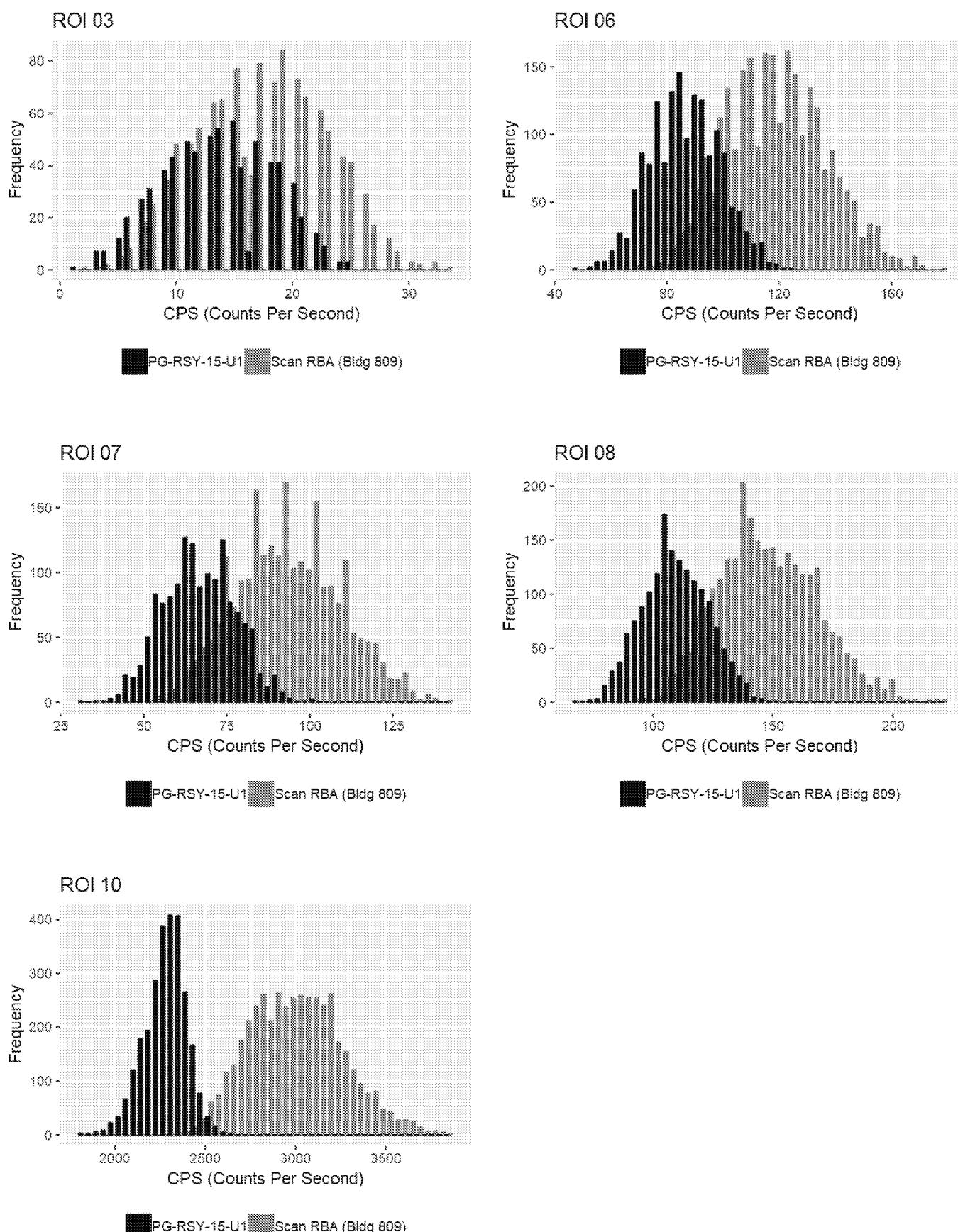
# Soil Scan Statistics

## Normal Q-Q Plots



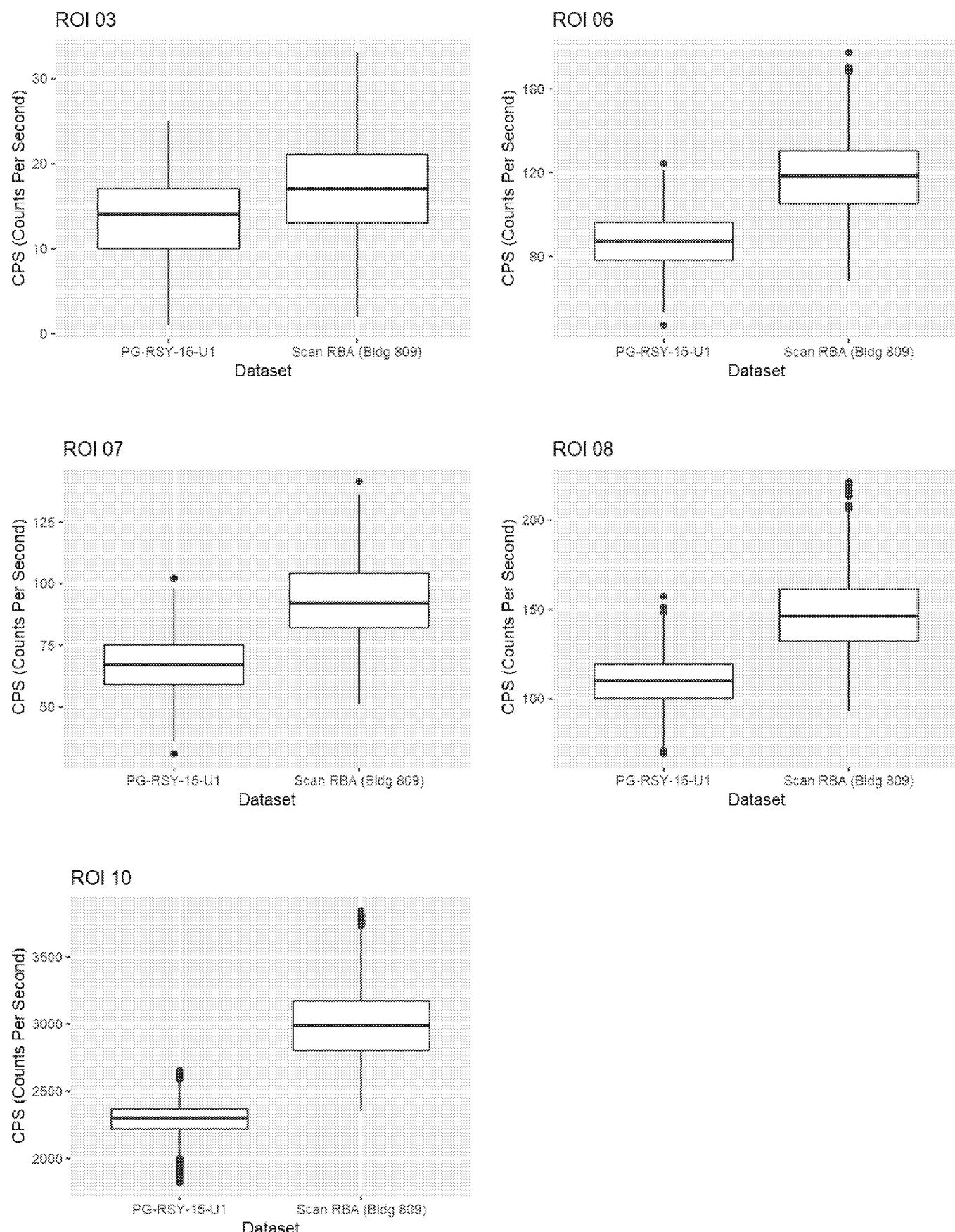
# Soil Scan Statistics

## Histograms



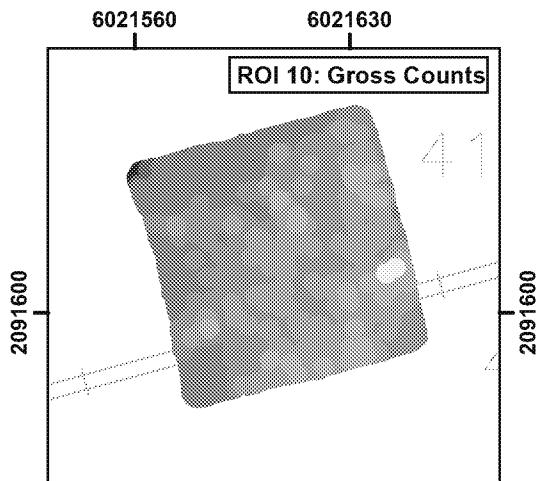
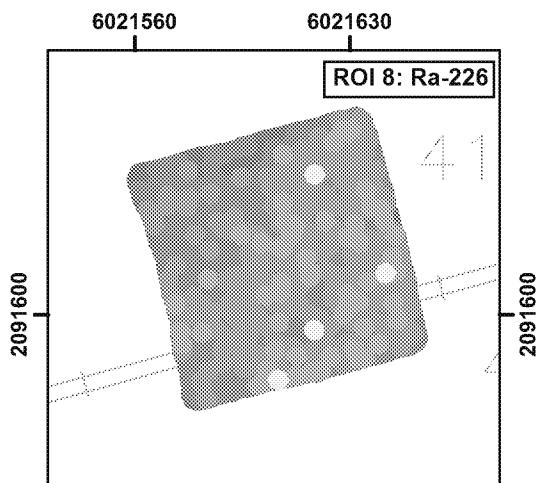
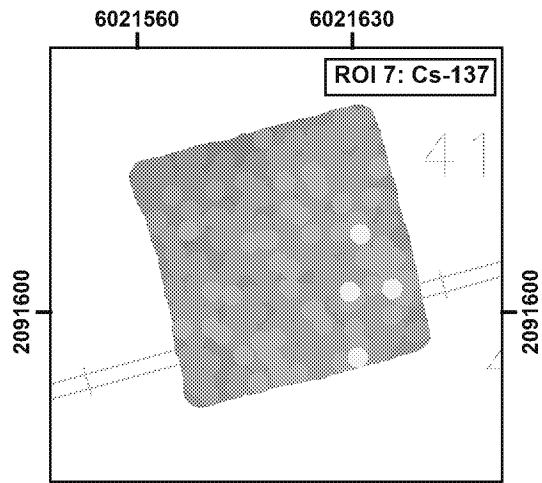
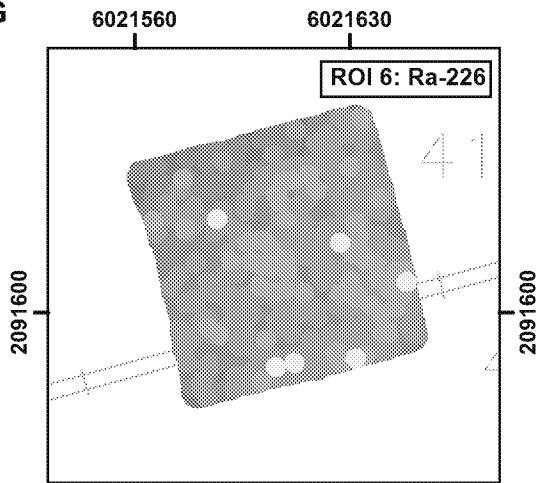
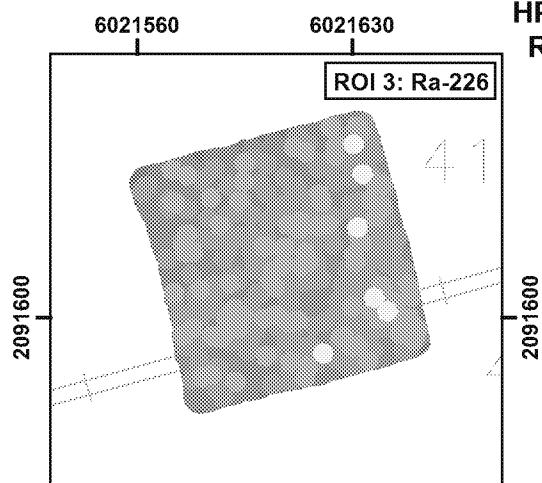
# Soil Scan Statistics

## Box Plots



**RSI Data Plots**  
**HPNS Parcel G**  
**RSY 15 Use 1**

TU-098A SFU



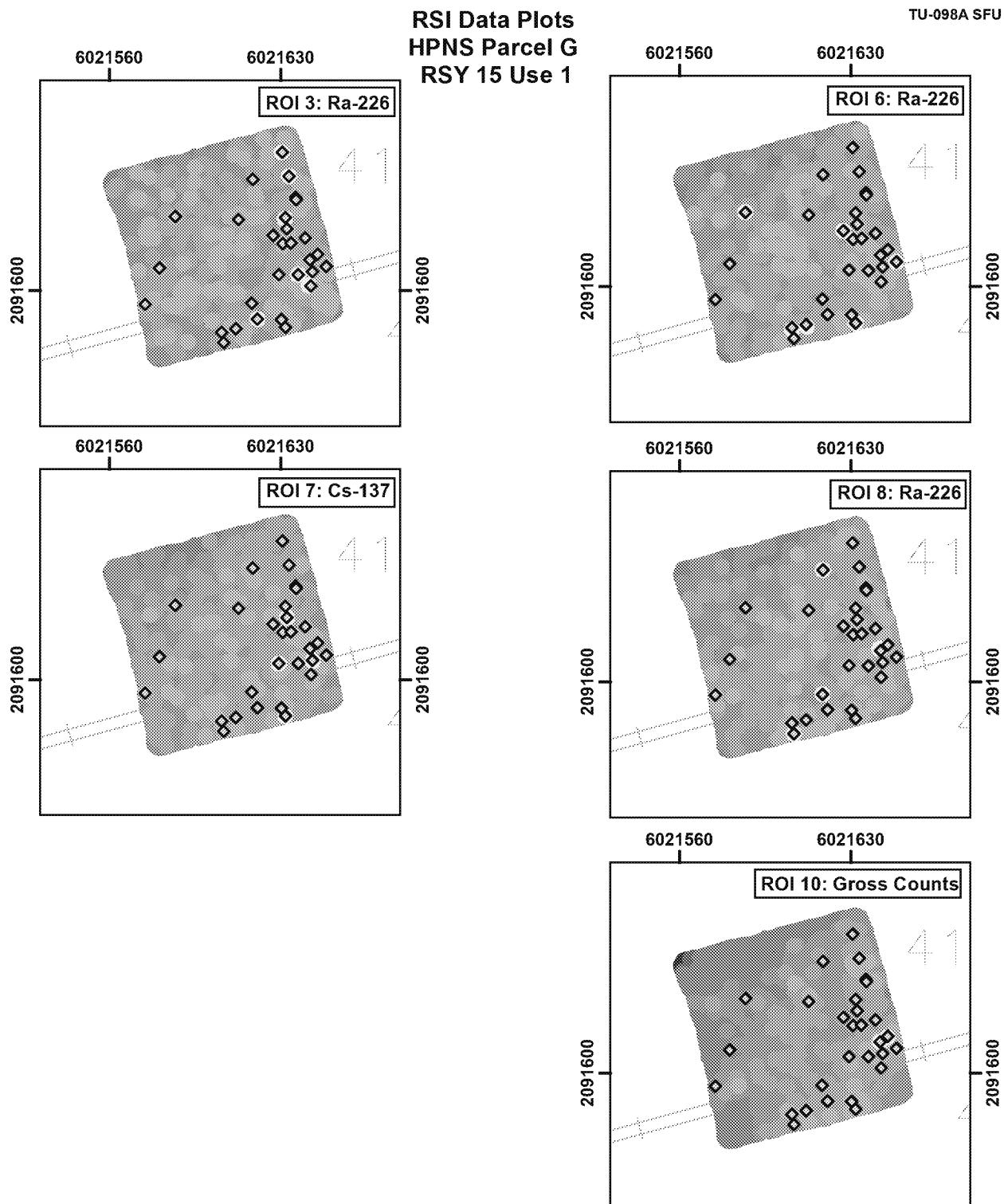
**RS 700 Gamma Walkover Survey Data (VD1)**

- |                      |                        |
|----------------------|------------------------|
| > 3 std dev          | ● > -1 to < 0 std dev  |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev         |

0      25      50      100  
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**RS 700 Gamma Walkover Survey Data (VD1)**

- ◆ Follow-Up Location
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

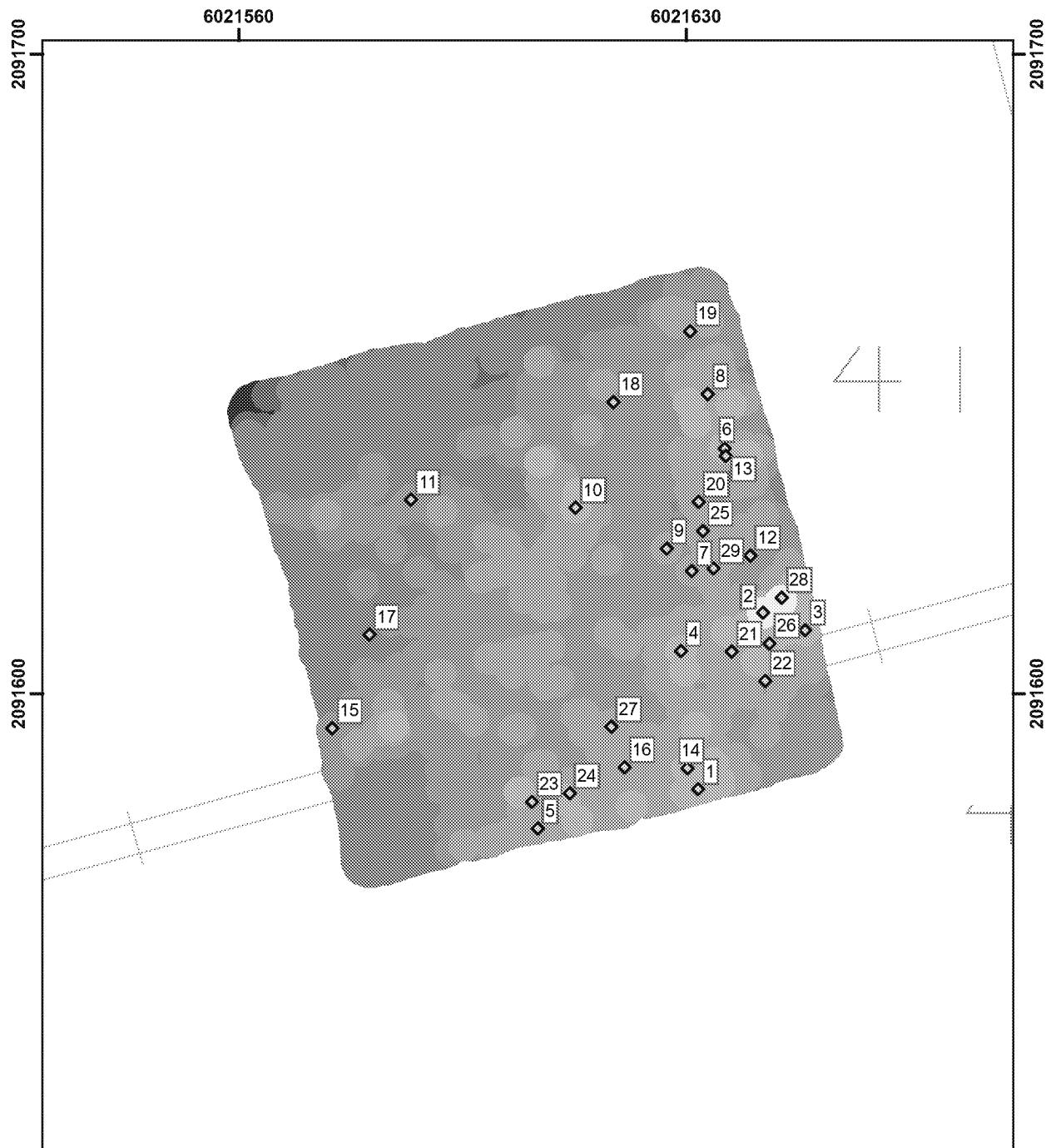
0      25      50      100  
 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



Follow-Up Static Survey  
HPNS Parcel G  
RSY 15 Use 1

TU-098A SFU



RSY 15 Use 1 (VD1, ROI 10 Gross Gamma)

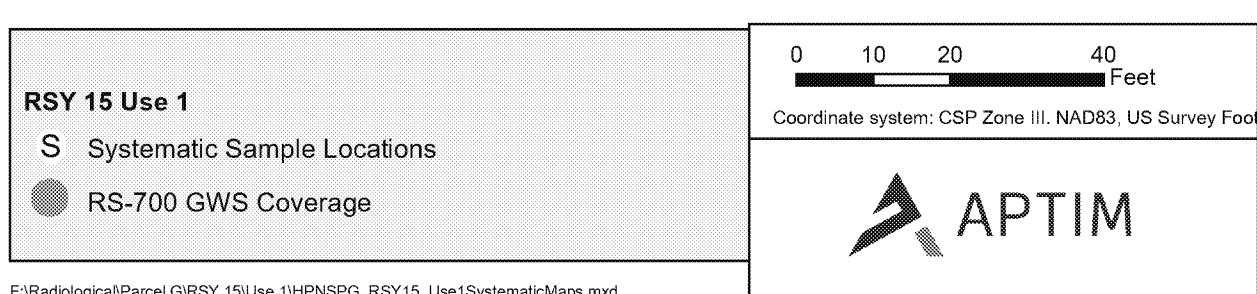
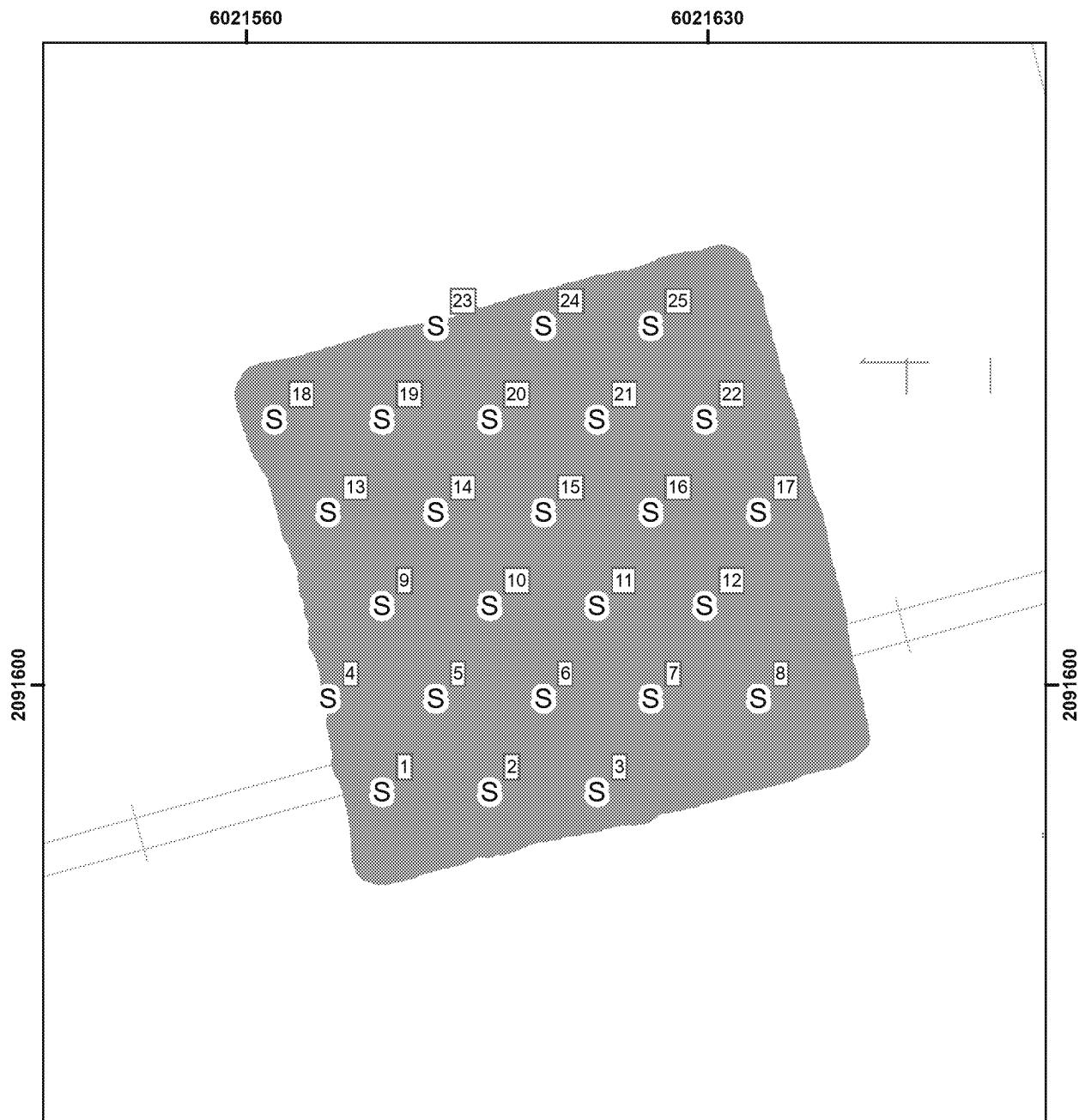
◆ Follow-Up Location	(white circle)	> 1 to < 2 std dev	(light gray circle)	> -2 to < -1 std dev
> 3 std dev	(medium gray circle)	> 0 to < 1 std dev	(dark gray circle)	> -3 to < -2 std dev
> 2 to < 3 std dev	(white circle)	> -1 to < 0 std dev	(light gray circle)	< -3 std dev

Coordinate system: CSP Zone III, NAD83, US Survey Foot



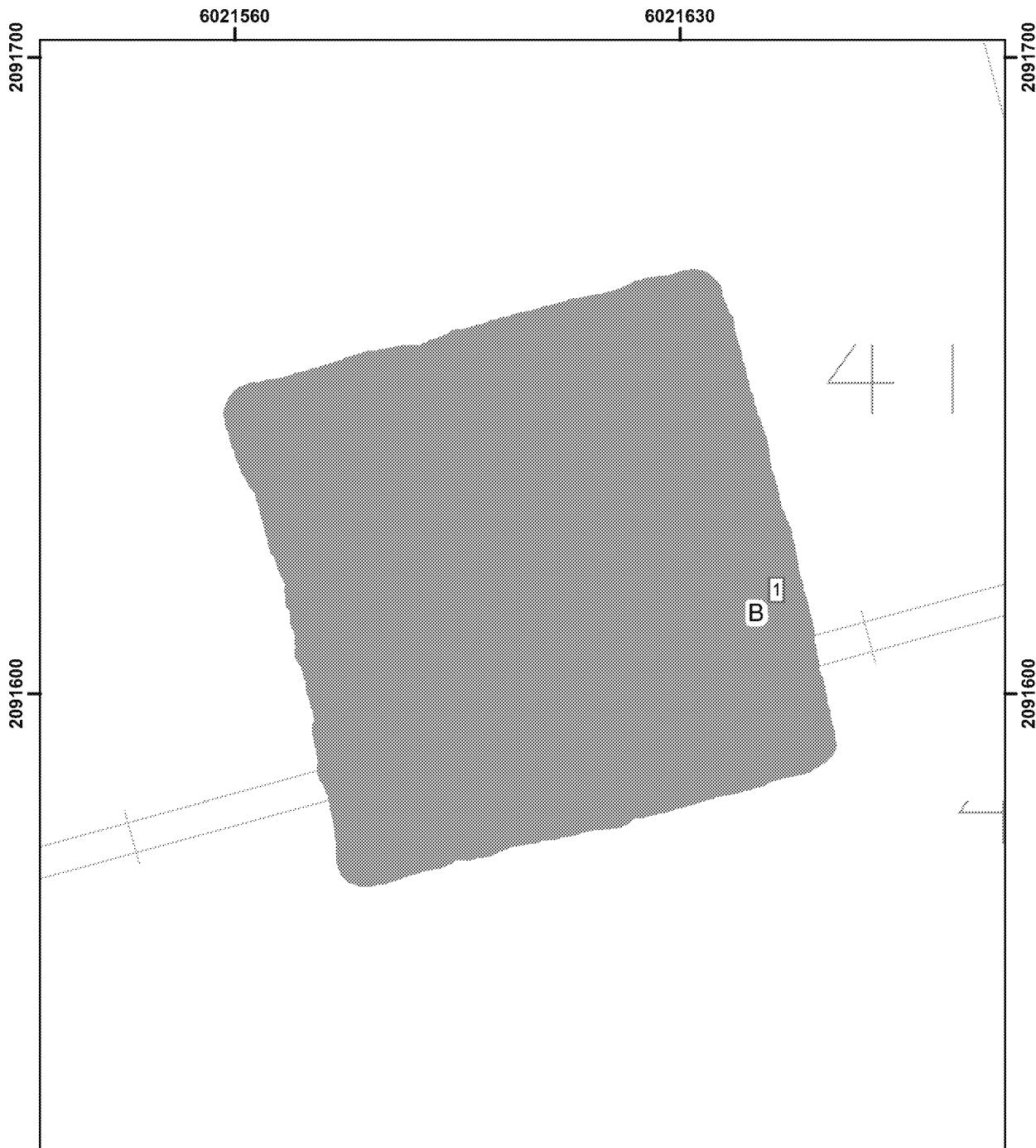
**Systematic Sampling  
HPNS Parcel G  
RSY 15 Use 1**

TU-098A SFU



**Biased Sampling  
HPNS Parcel G  
RSY 15 Use 1**

TU-098A SFU



**RSY 15 Use 1**

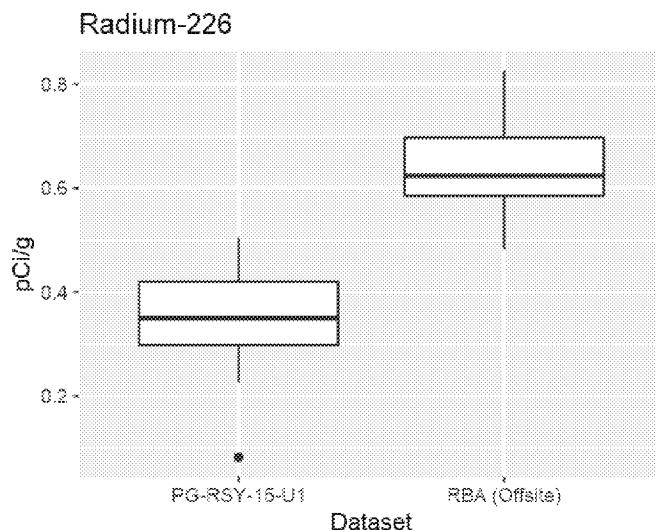
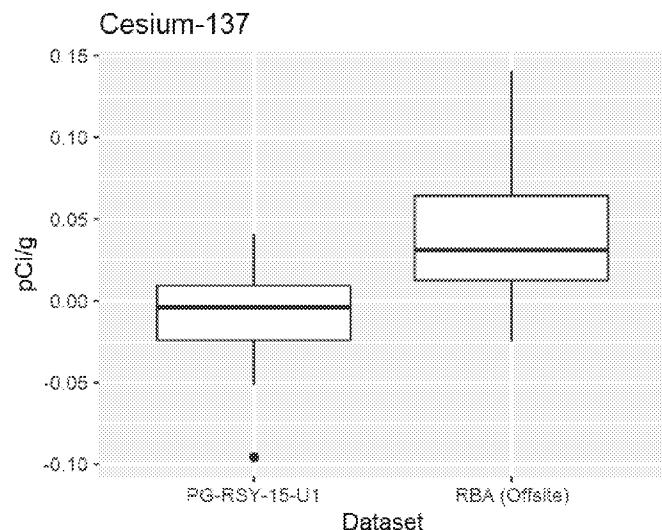
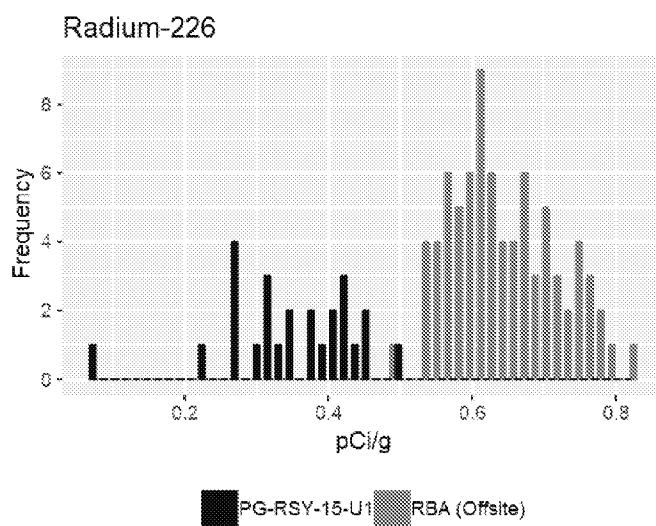
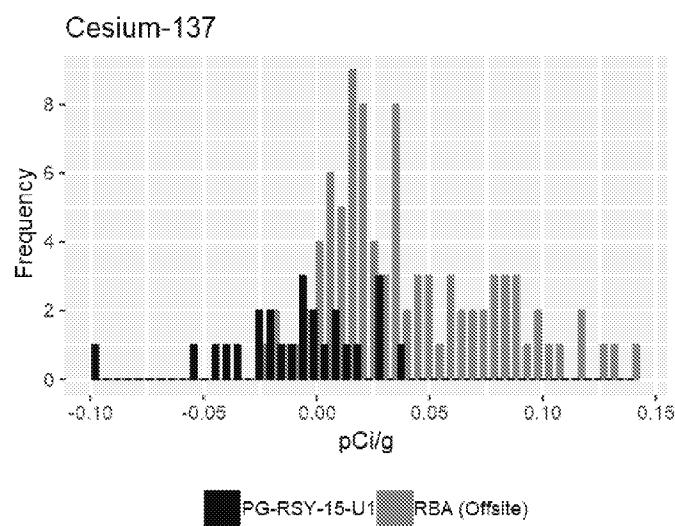
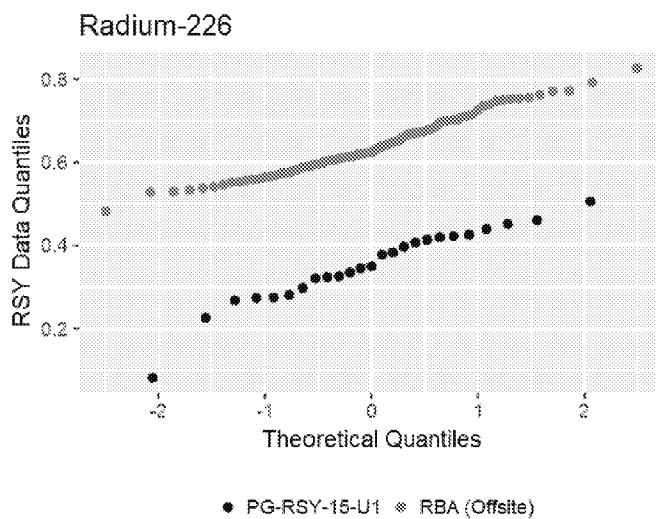
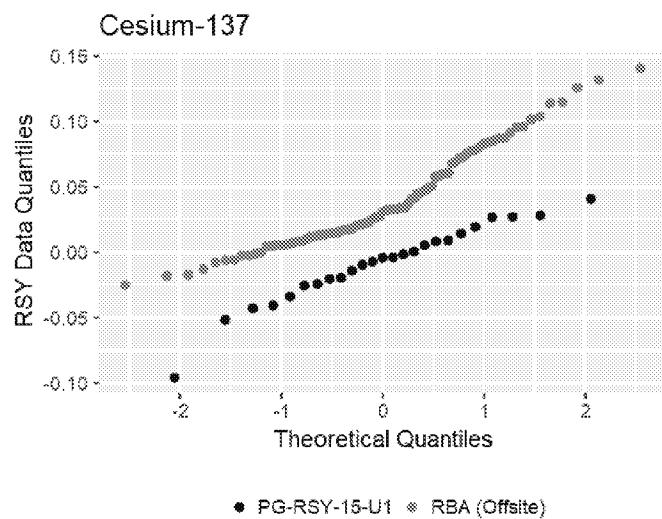
B Biased Sample Locations

● RS-700 GWS Coverage

Coordinate system: CSP Zone III, NAD83, US Survey Foot



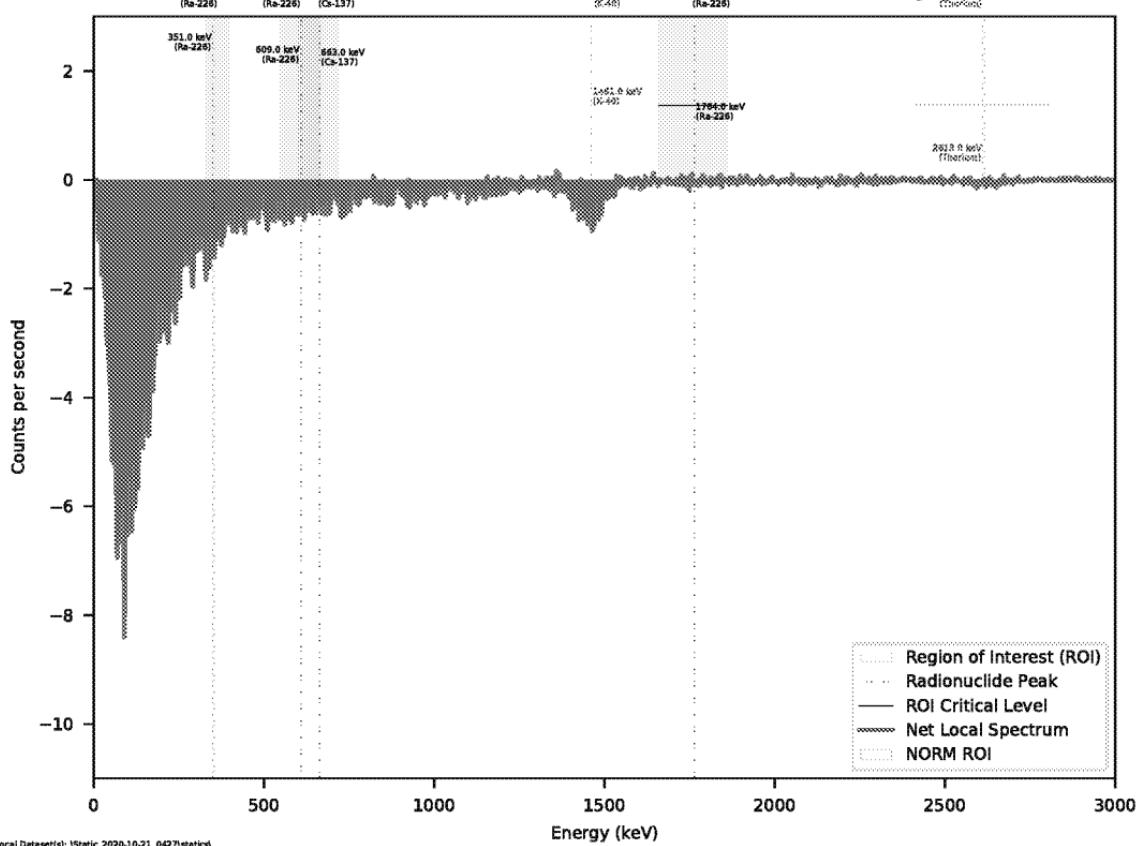
## Soil Sample Statistics





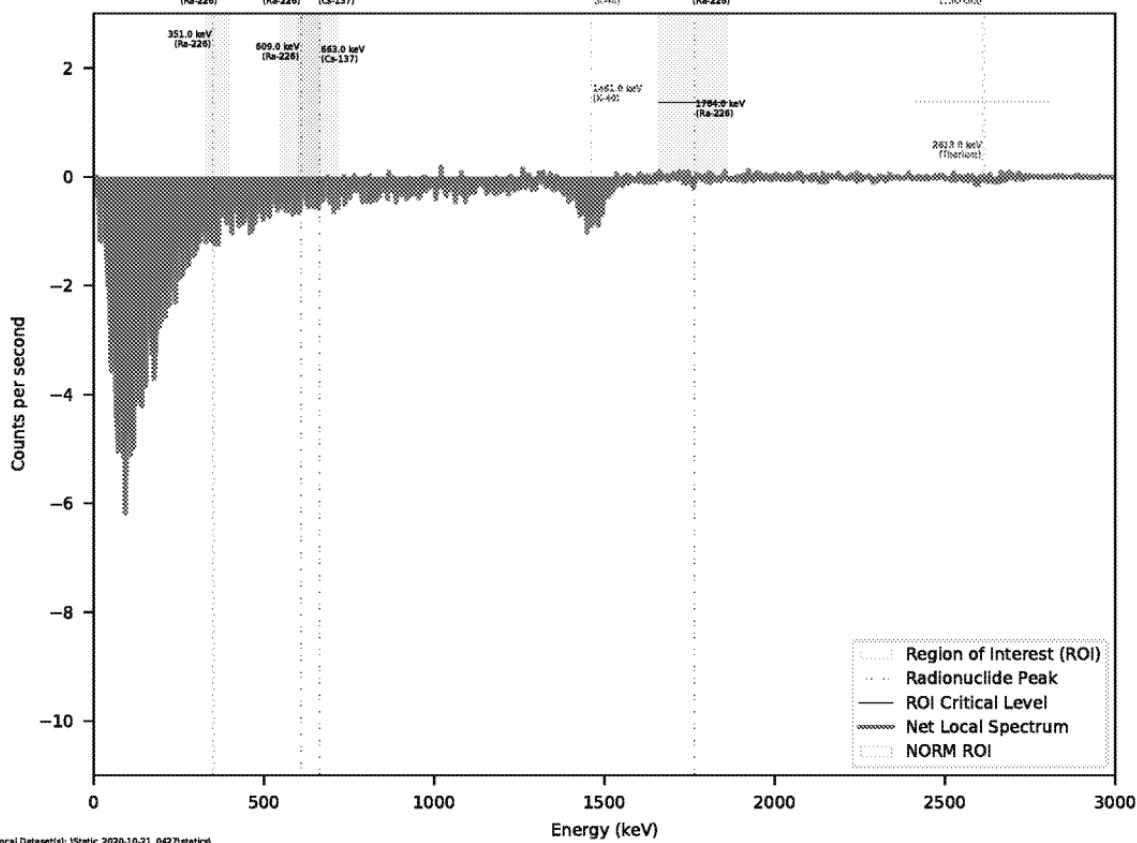
# Net Gamma Spectrum, Static Location: 1

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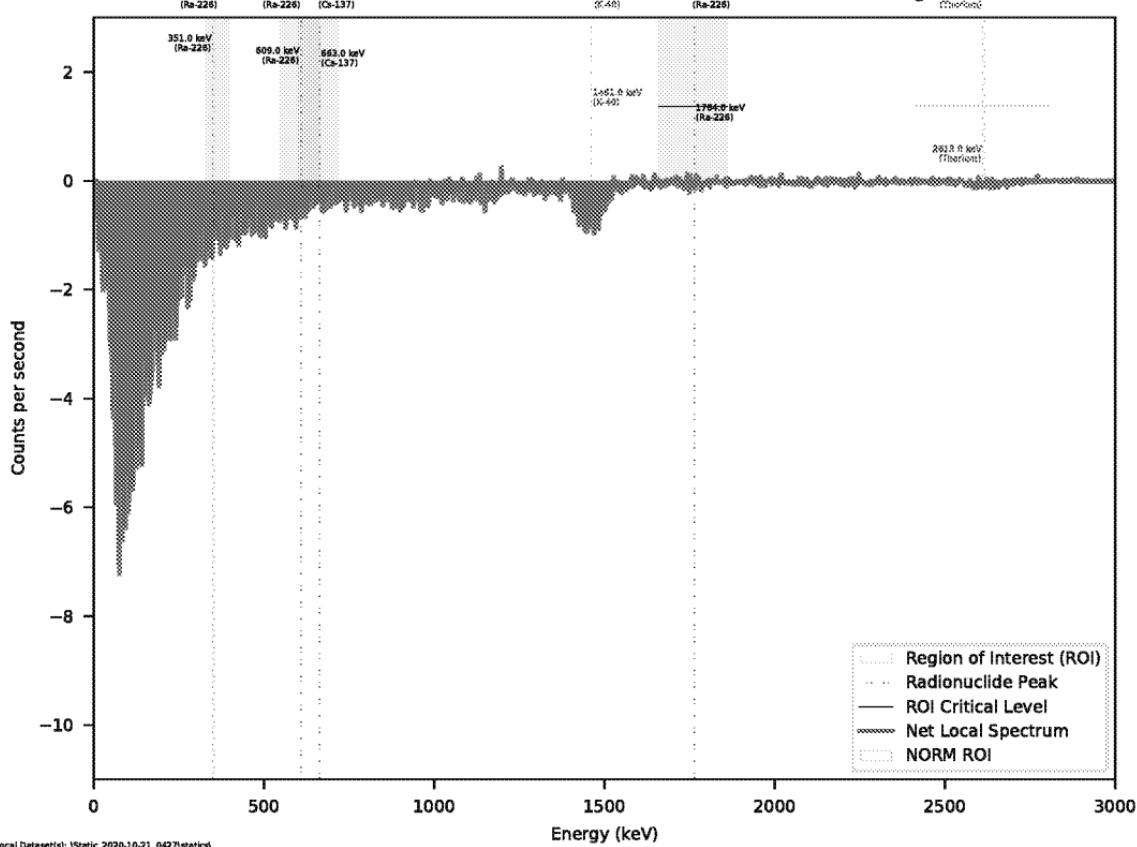
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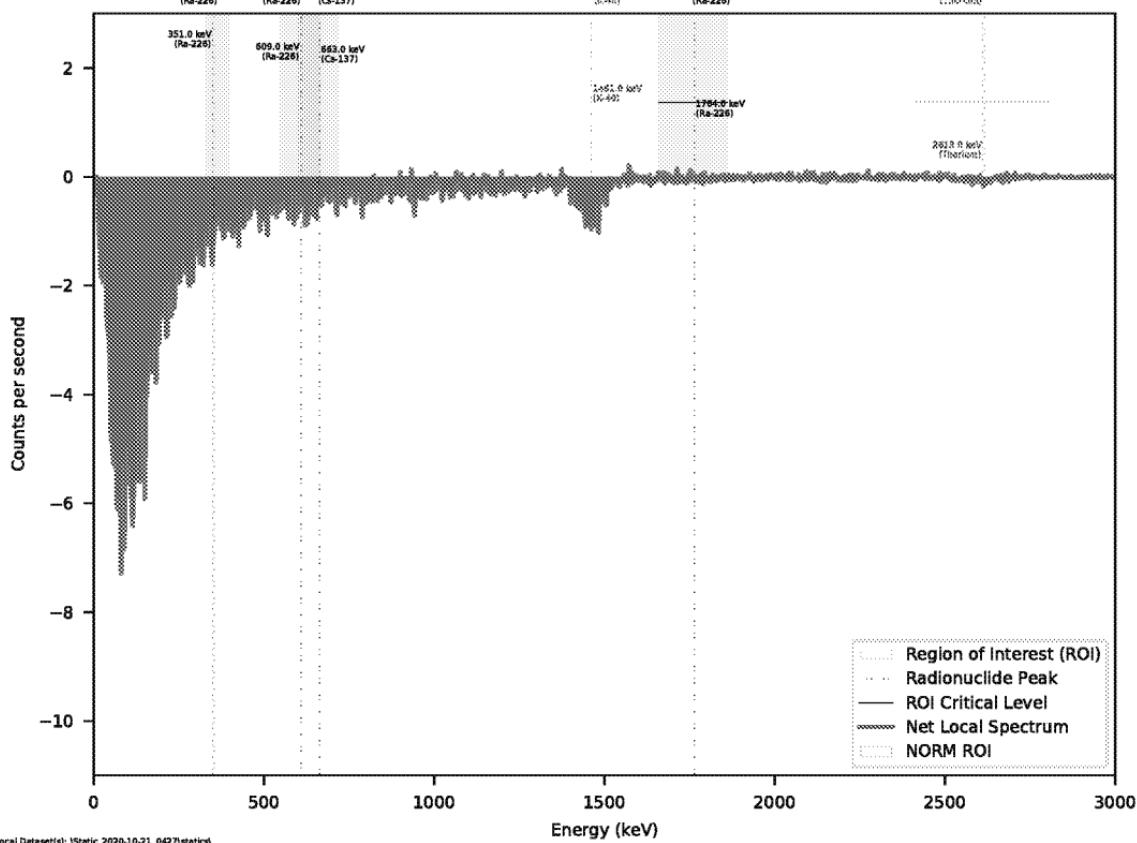
## Net Gamma Spectrum, Static Location: 3

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# Net Gamma Spectrum, Static Location: 4

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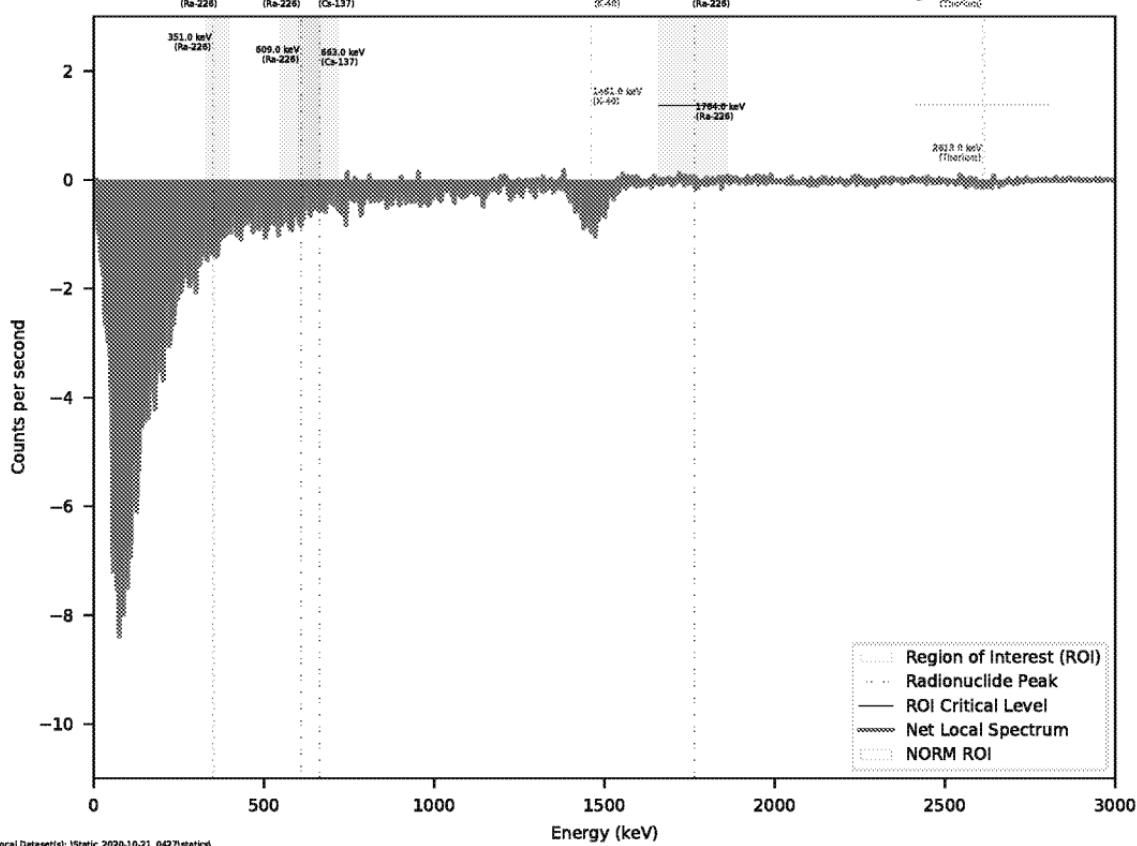
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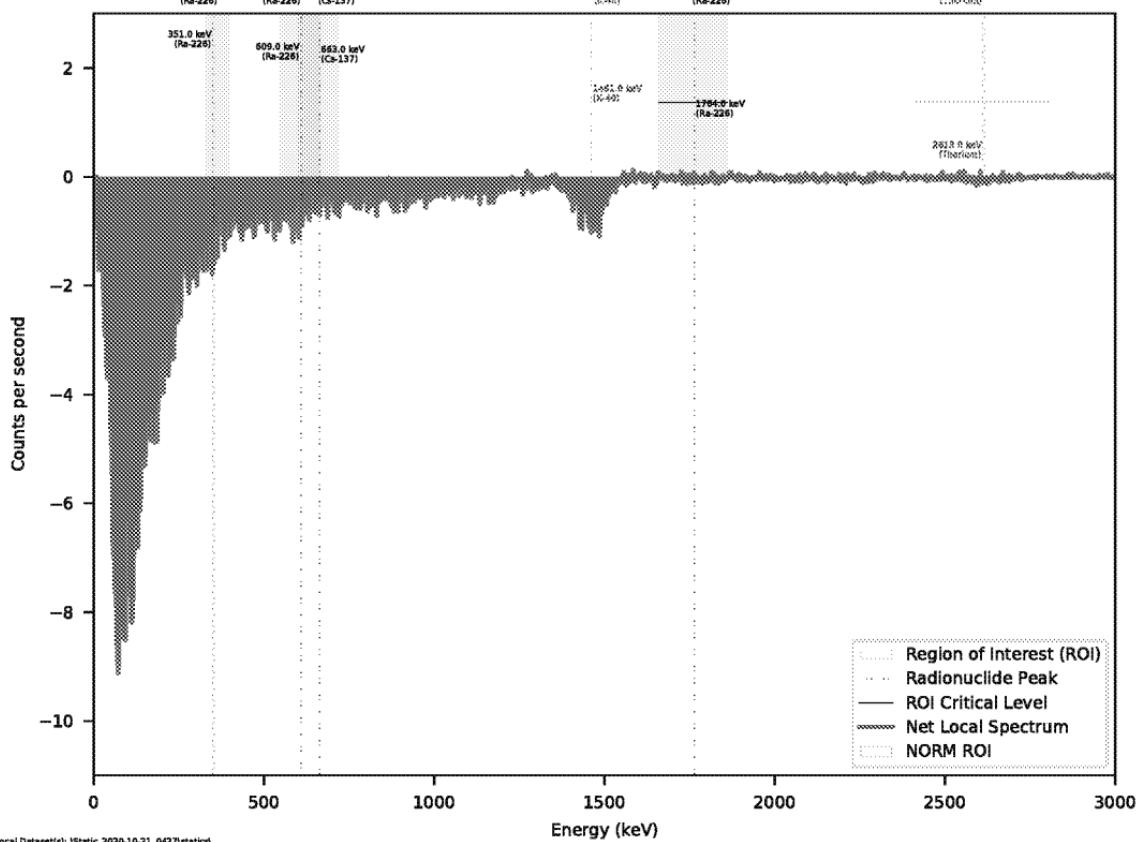
# Net Gamma Spectrum, Static Location: 5

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# Net Gamma Spectrum, Static Location: 6

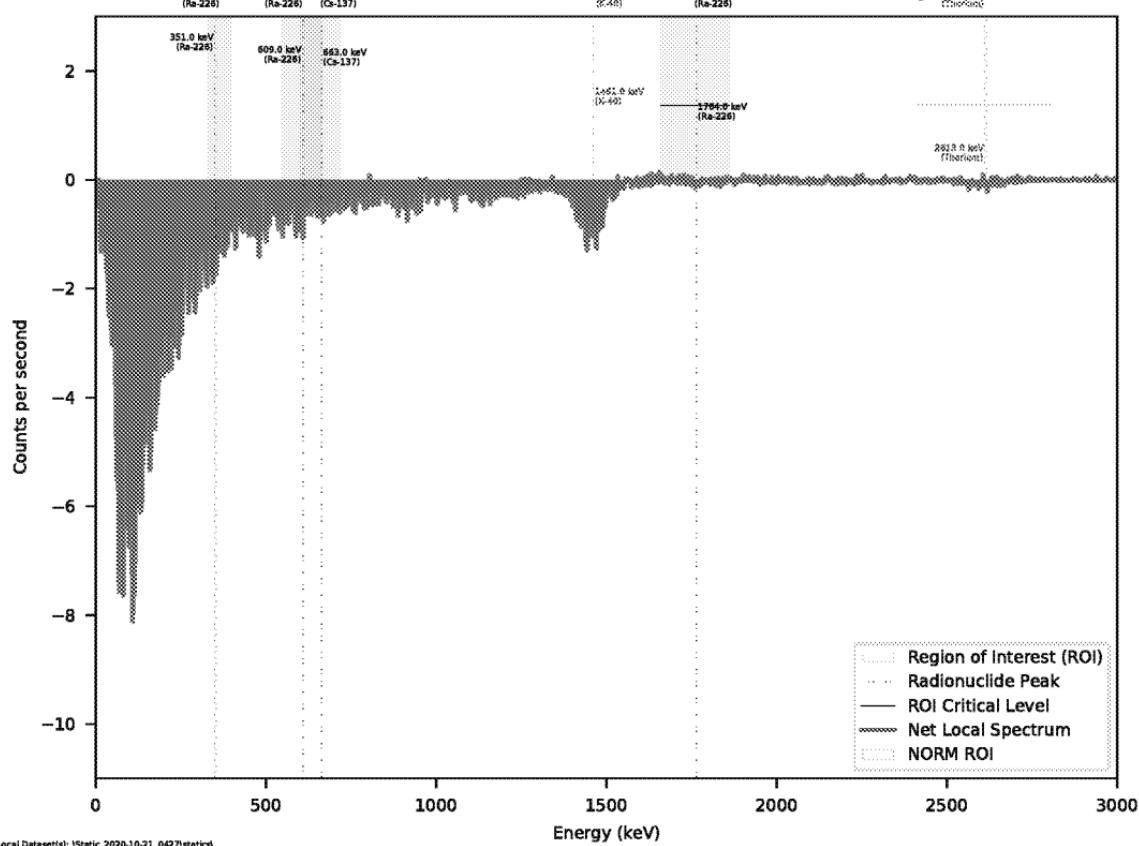
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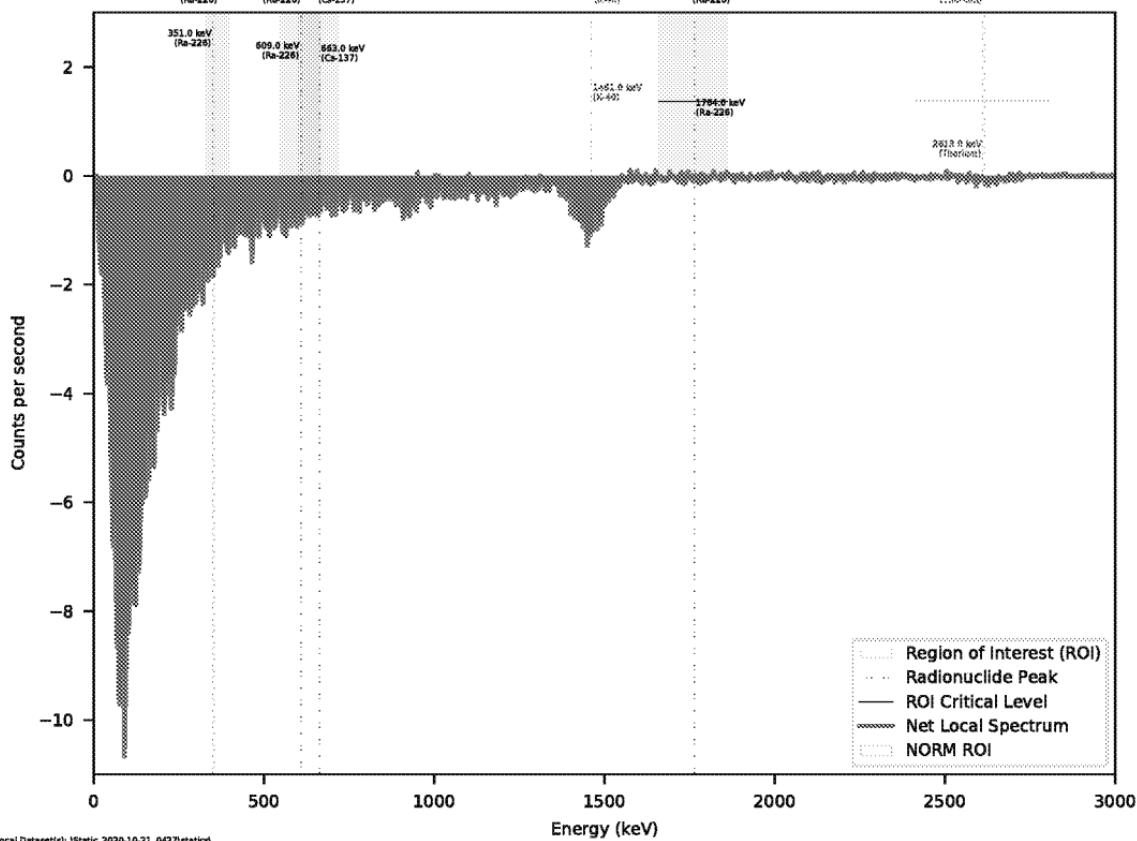
## Net Gamma Spectrum, Static Location: 7

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# Net Gamma Spectrum, Static Location: 8

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Circular



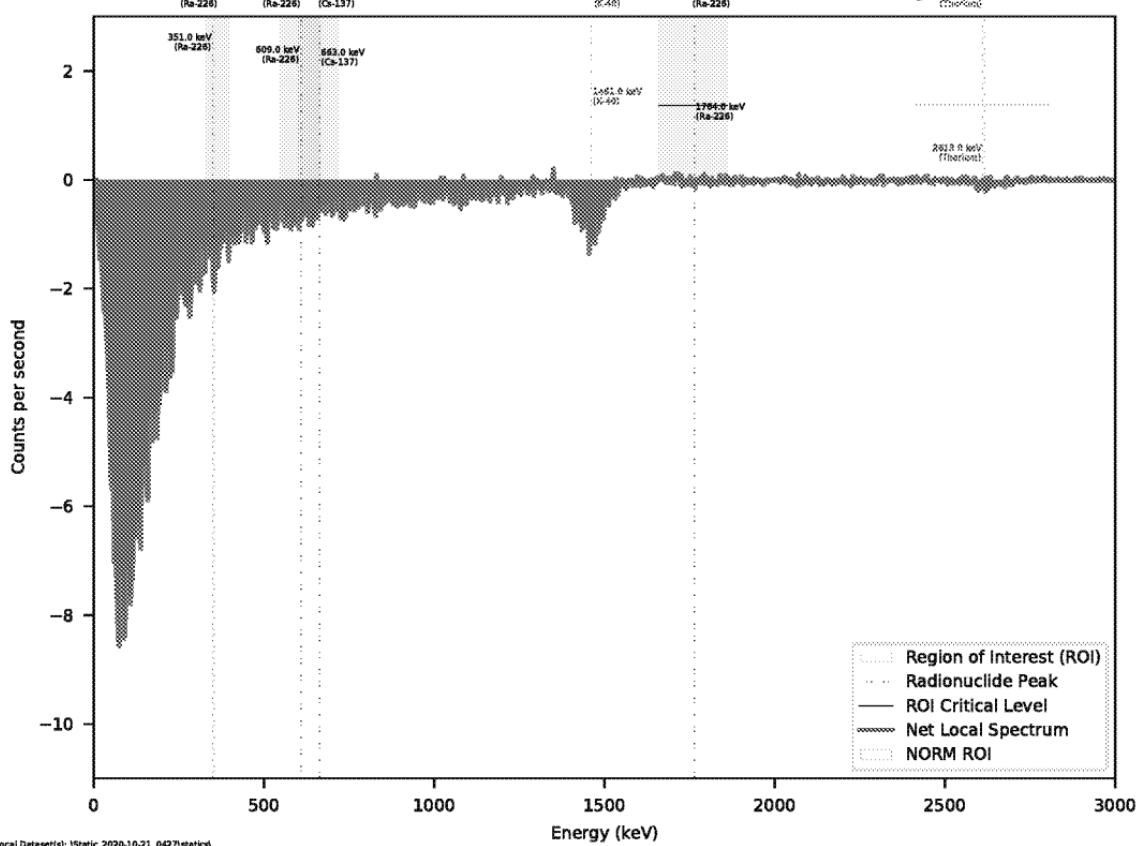
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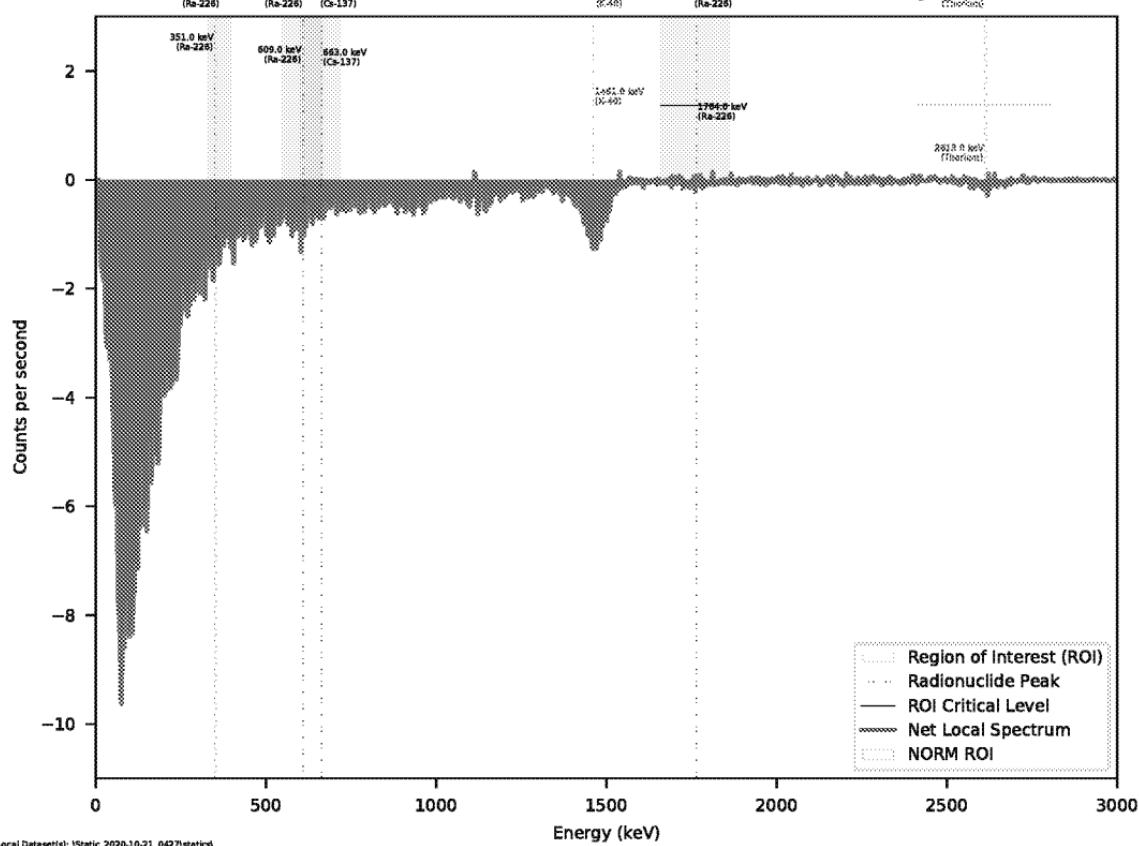
## Net Gamma Spectrum, Static Location: 9

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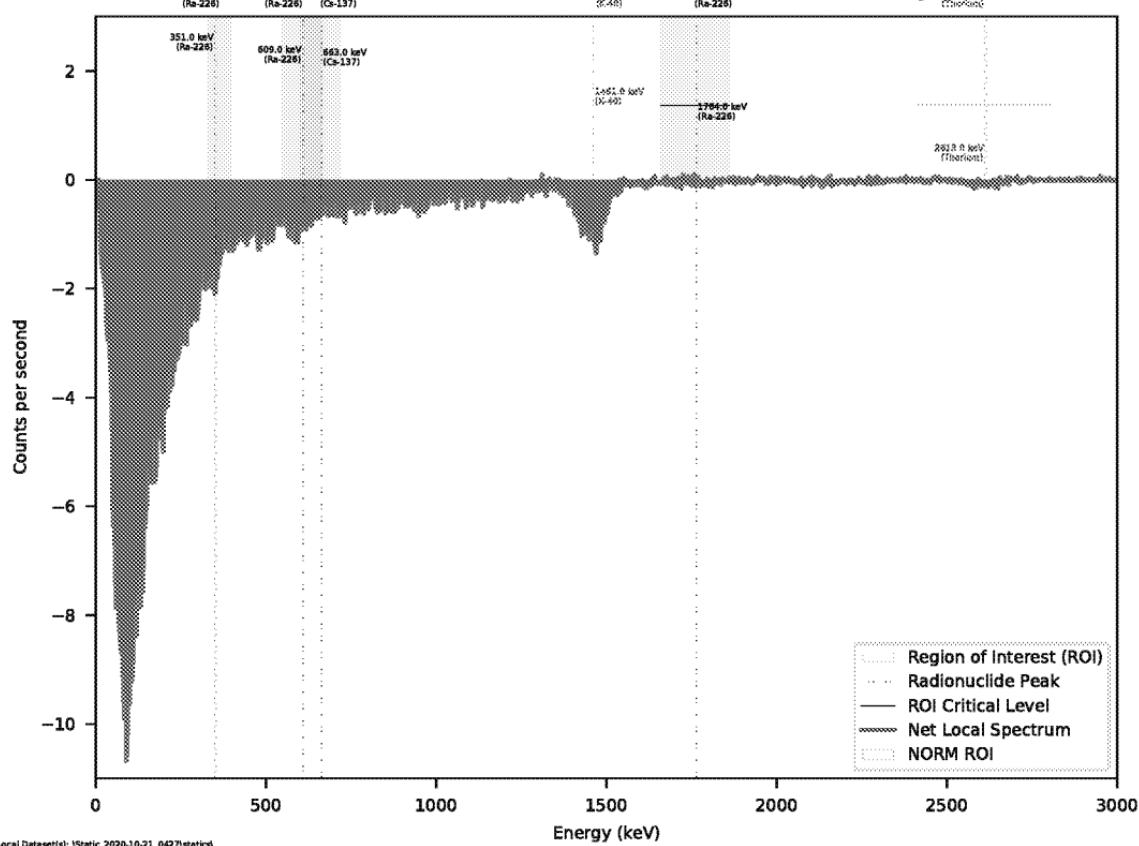
## Net Gamma Spectrum, Static Location: 10

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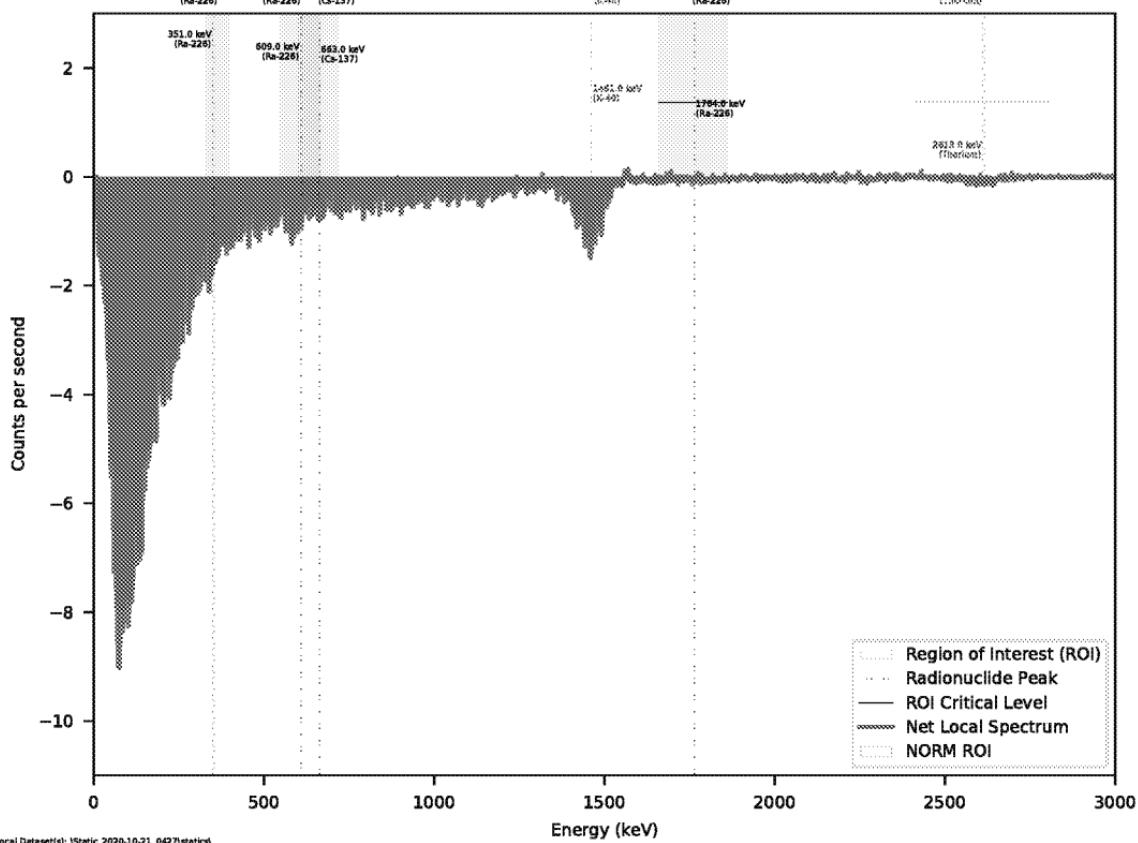
## Net Gamma Spectrum, Static Location: 11

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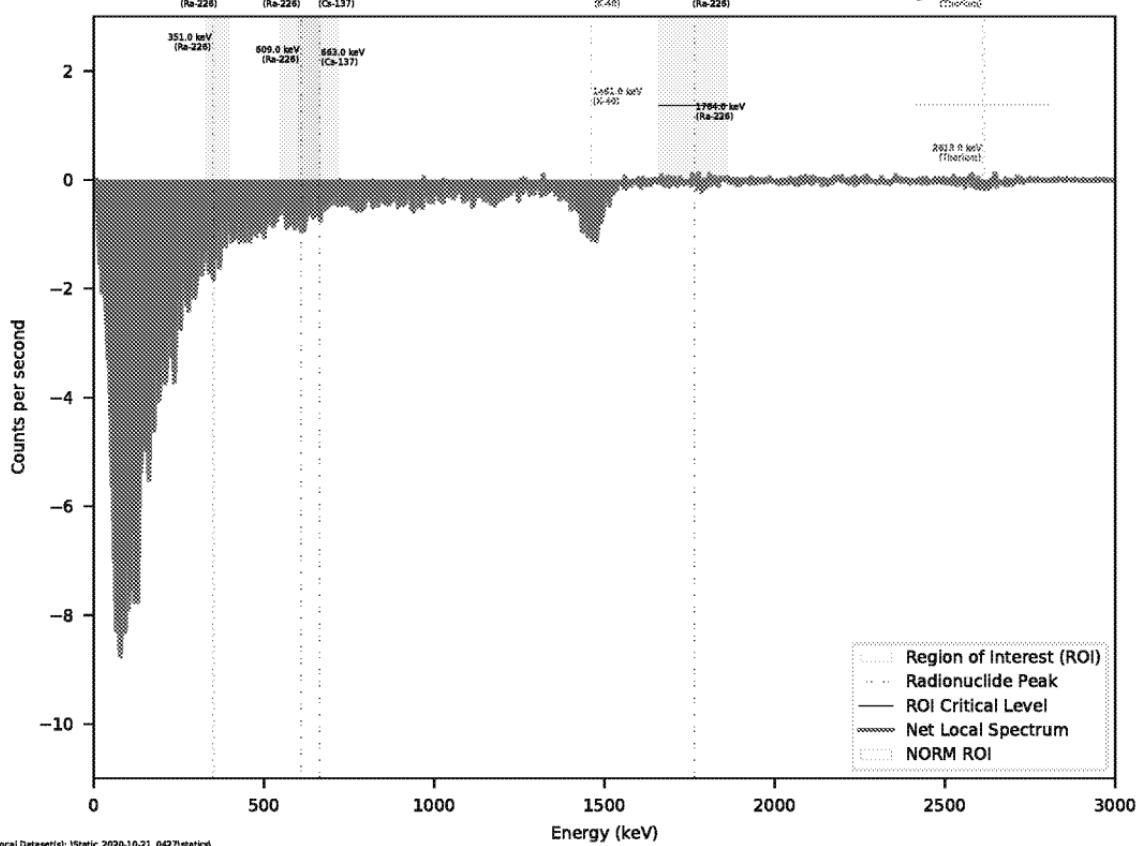
# Net Gamma Spectrum, Static Location: 12

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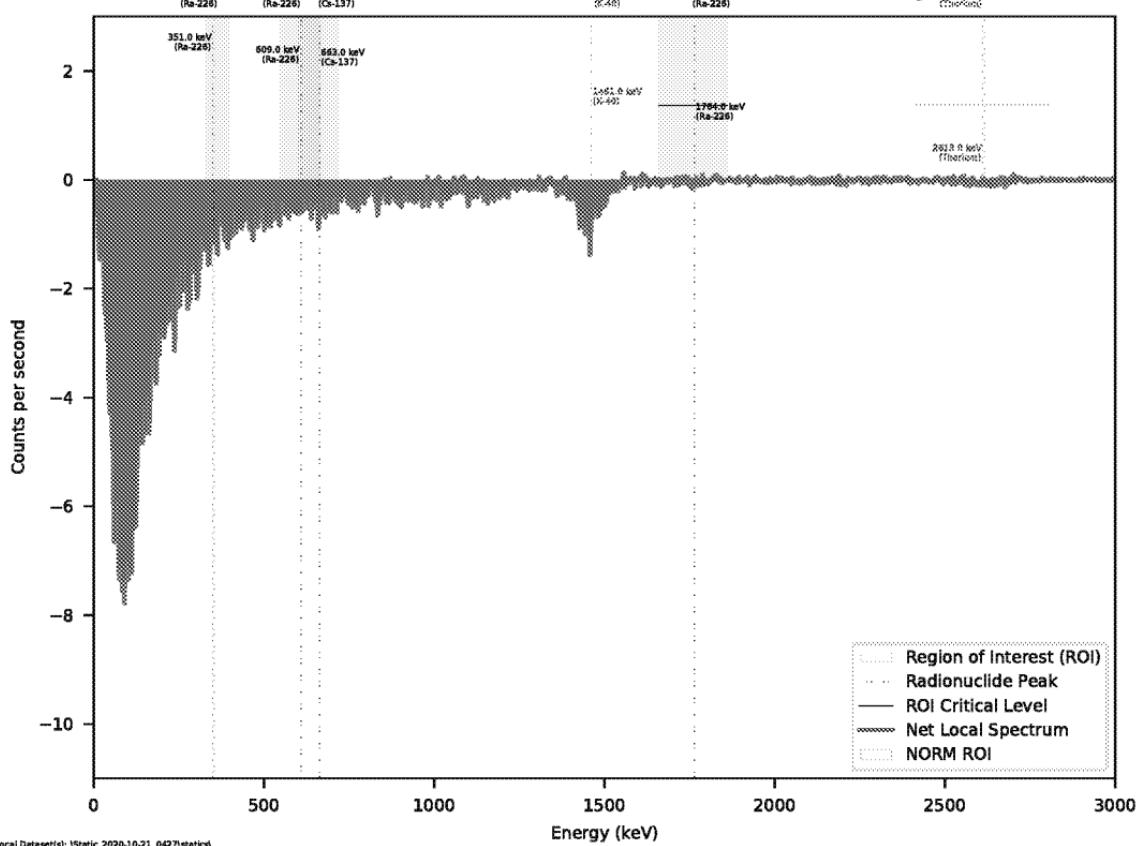
## Net Gamma Spectrum, Static Location: 13

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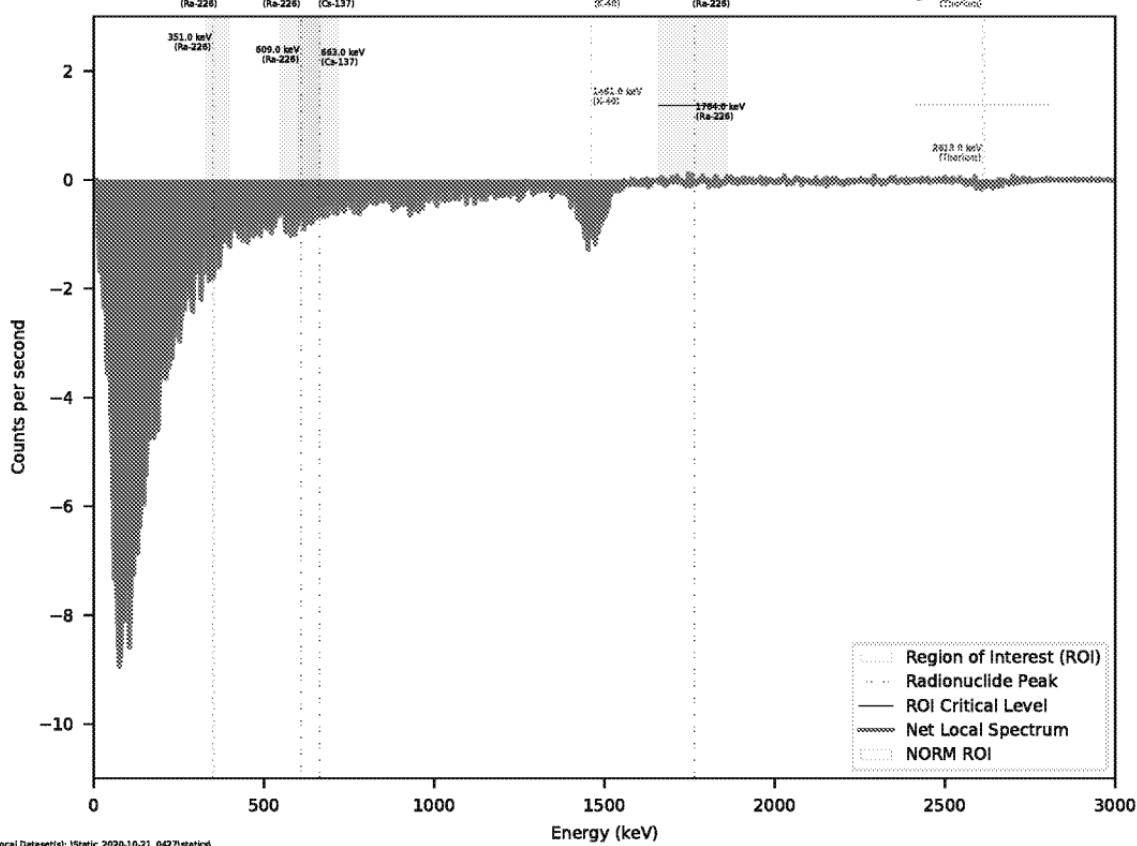
## Net Gamma Spectrum, Static Location: 14

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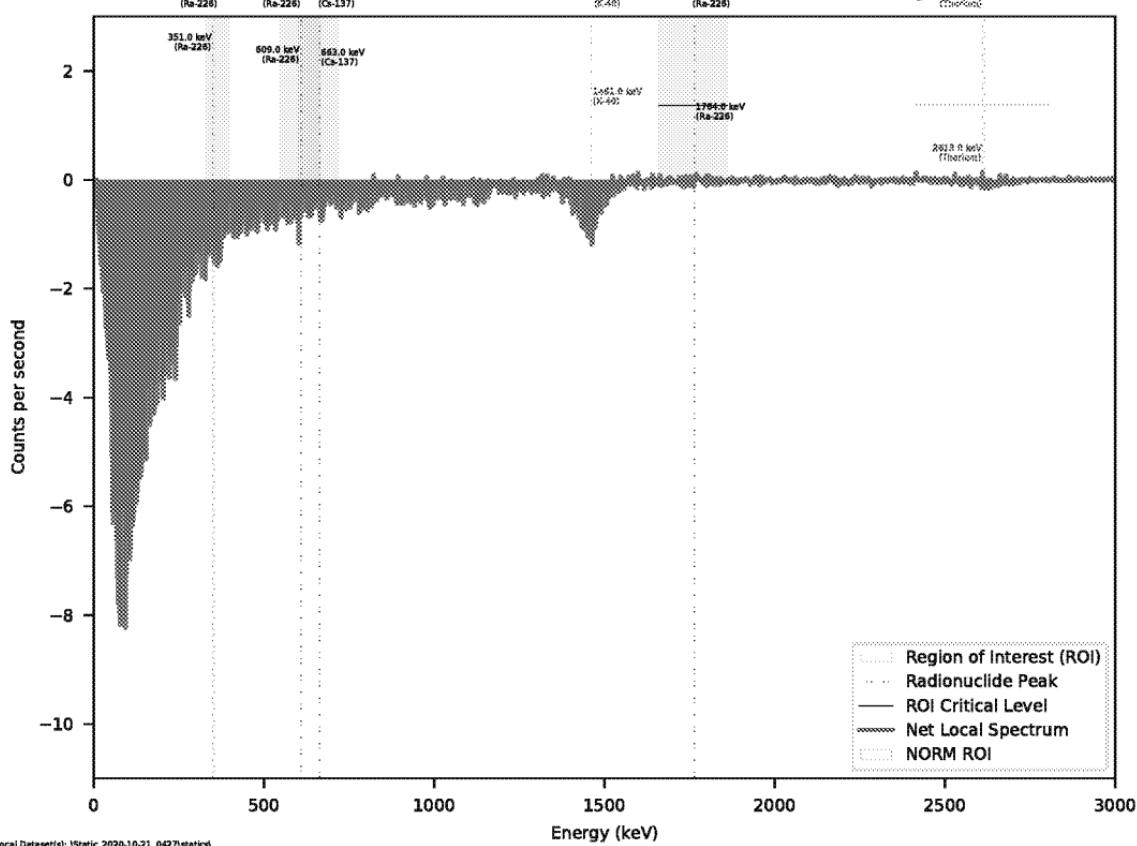
## Net Gamma Spectrum, Static Location: 15

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## Net Gamma Spectrum, Static Location: 16

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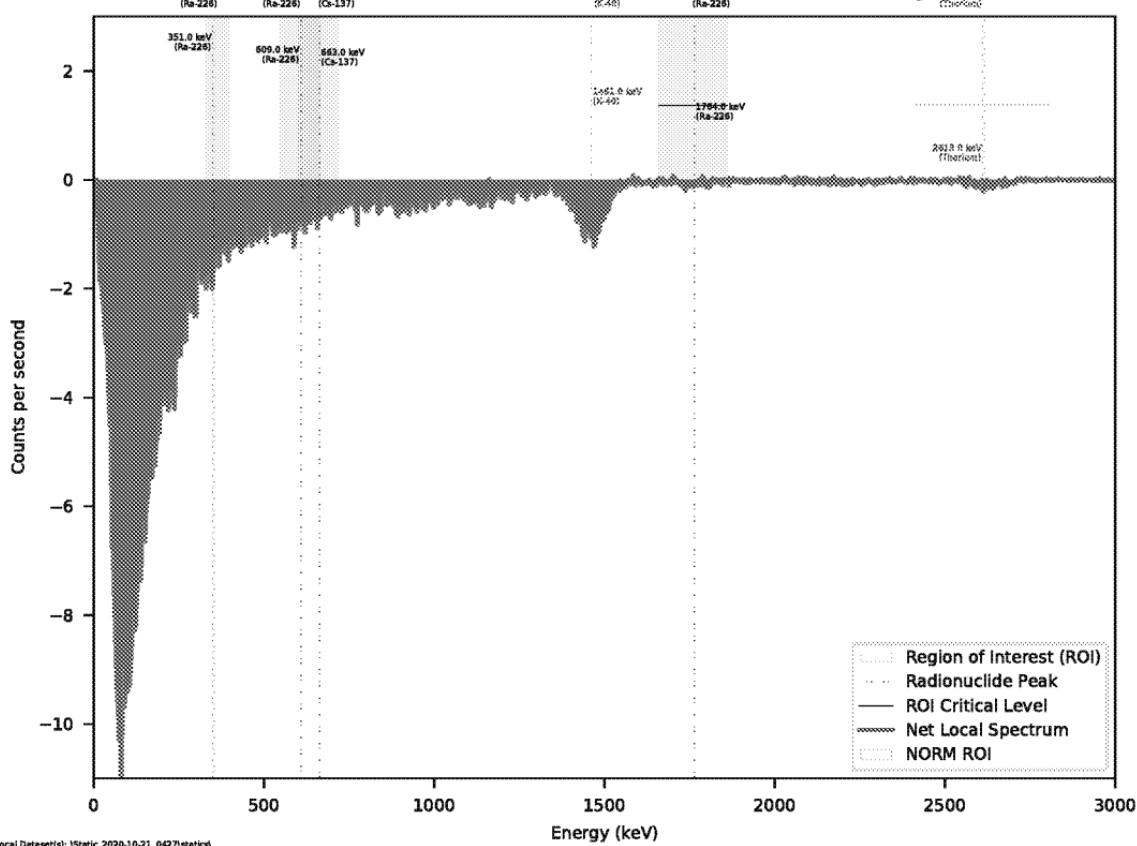
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Background Dataset(s): RSII\_SoilRBA\_Static.csv

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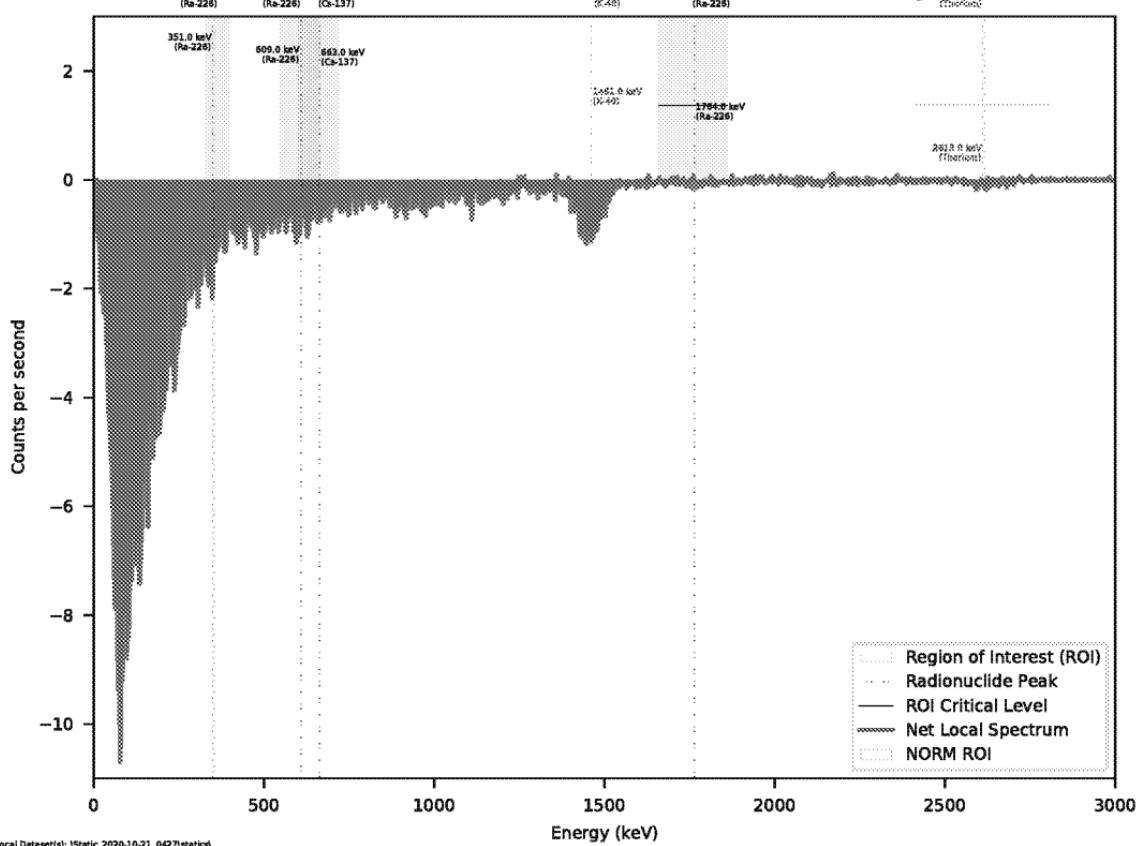
# Net Gamma Spectrum, Static Location: 17

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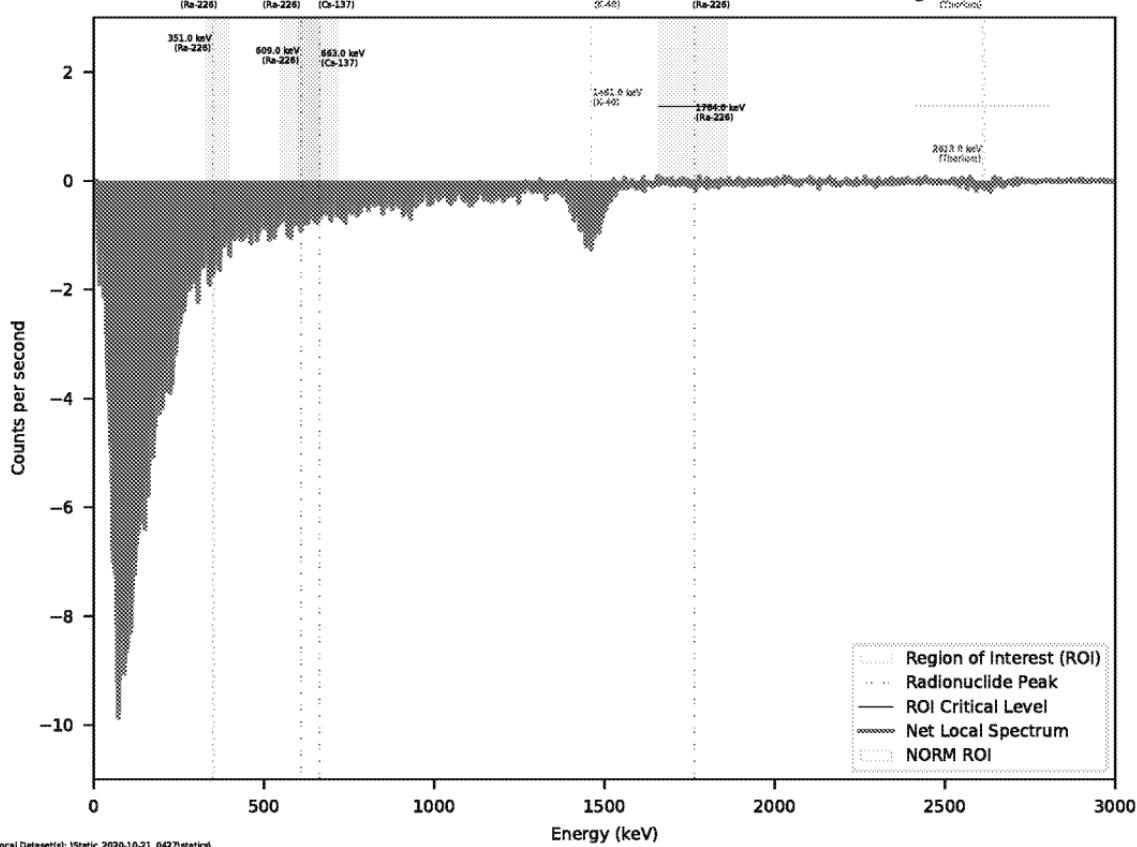
## Net Gamma Spectrum, Static Location: 18

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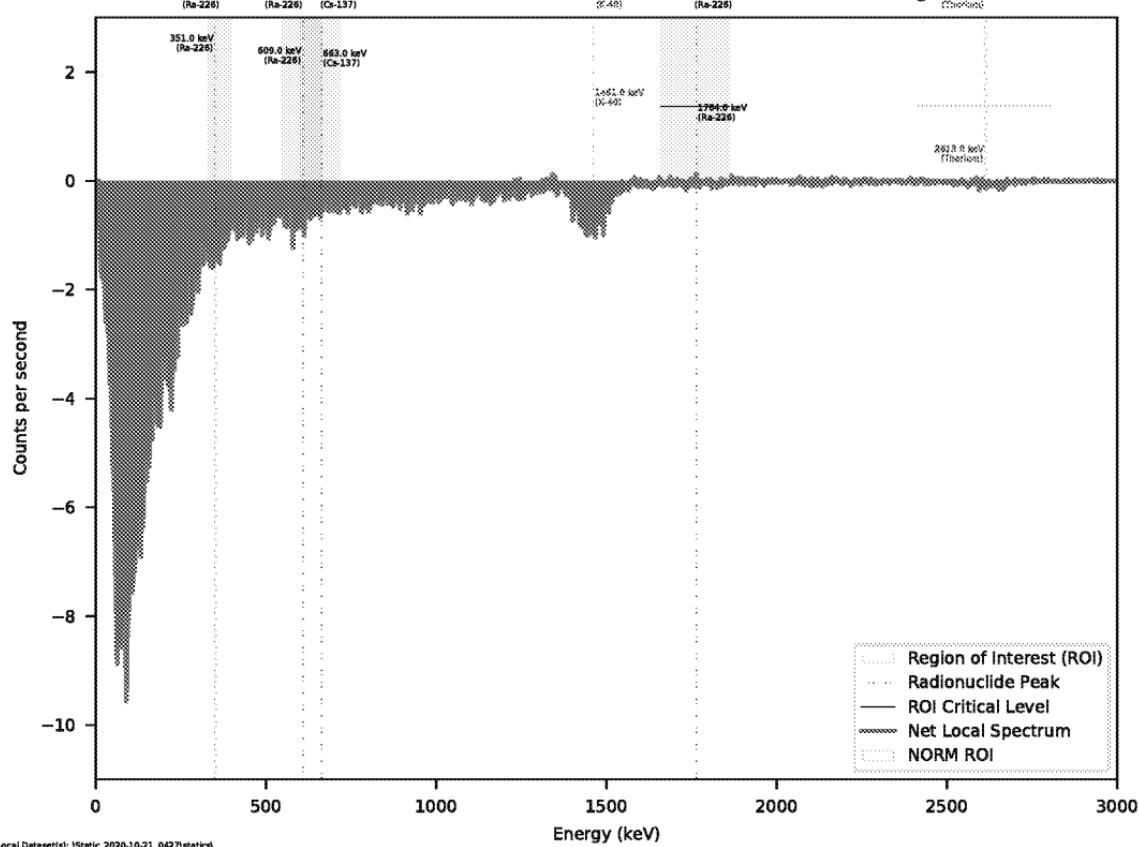
## Net Gamma Spectrum, Static Location: 19

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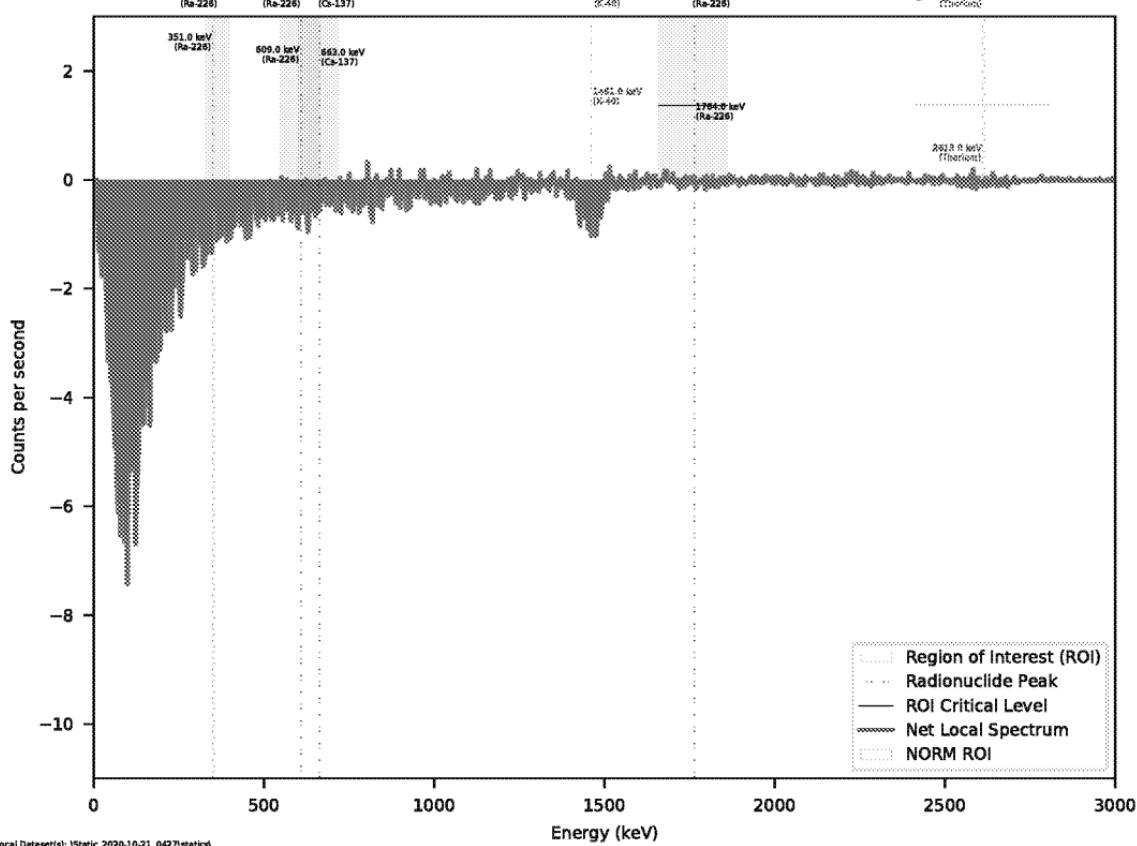
## Net Gamma Spectrum, Static Location: 20

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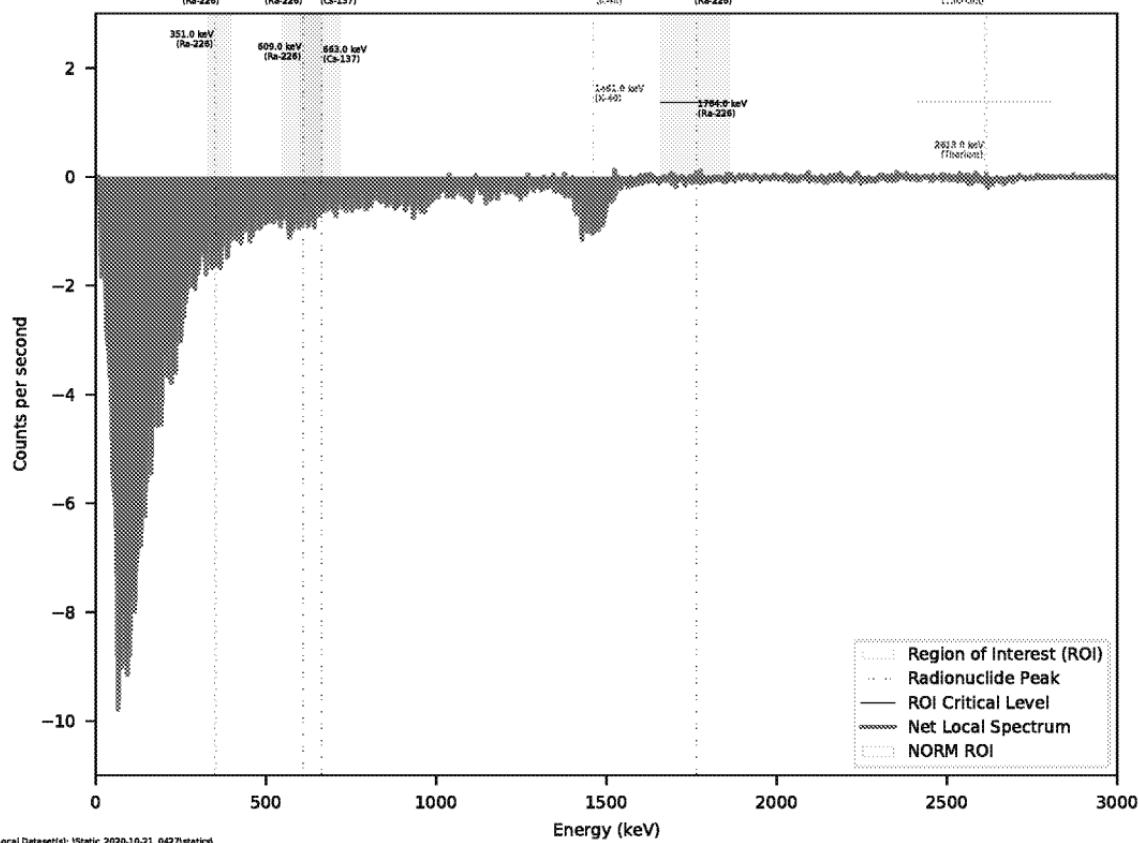
# Net Gamma Spectrum, Static Location: 21

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# Net Gamma Spectrum, Static Location: 22

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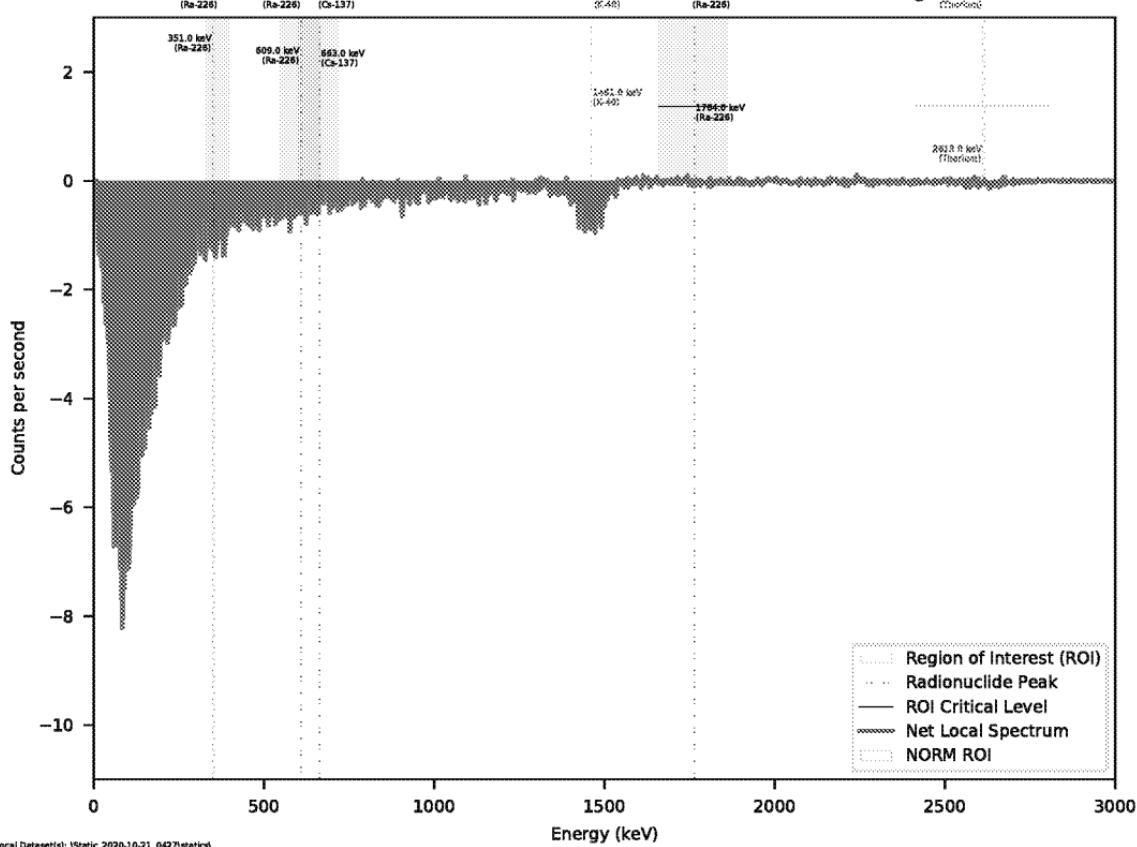
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Background Dataset(s): RSII\_SoilRBA\_Static.csv

Local Coordinates (Longitude, Latitude): -122.36729934873233, 37.72435045352111

ED\_006360A\_00000356-00035

## Net Gamma Spectrum, Static Location: 23

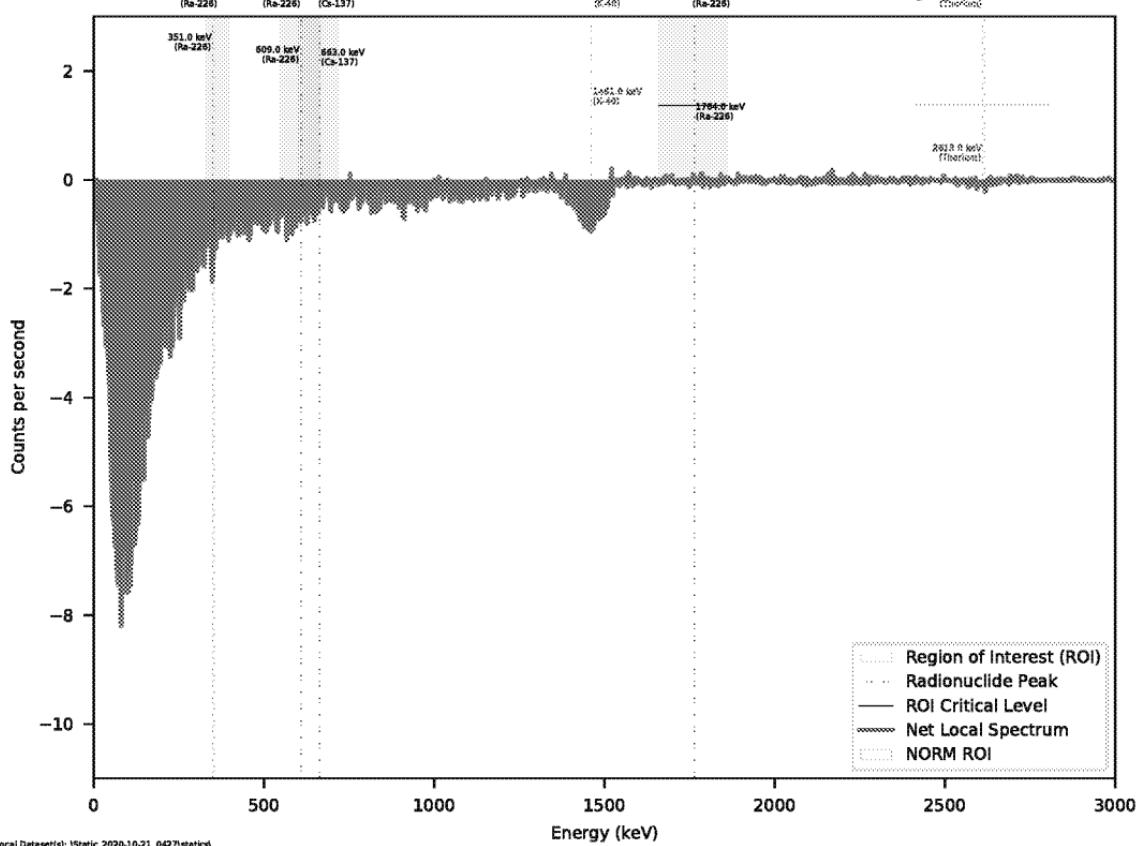
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ED\_006360A\_00000356-00036

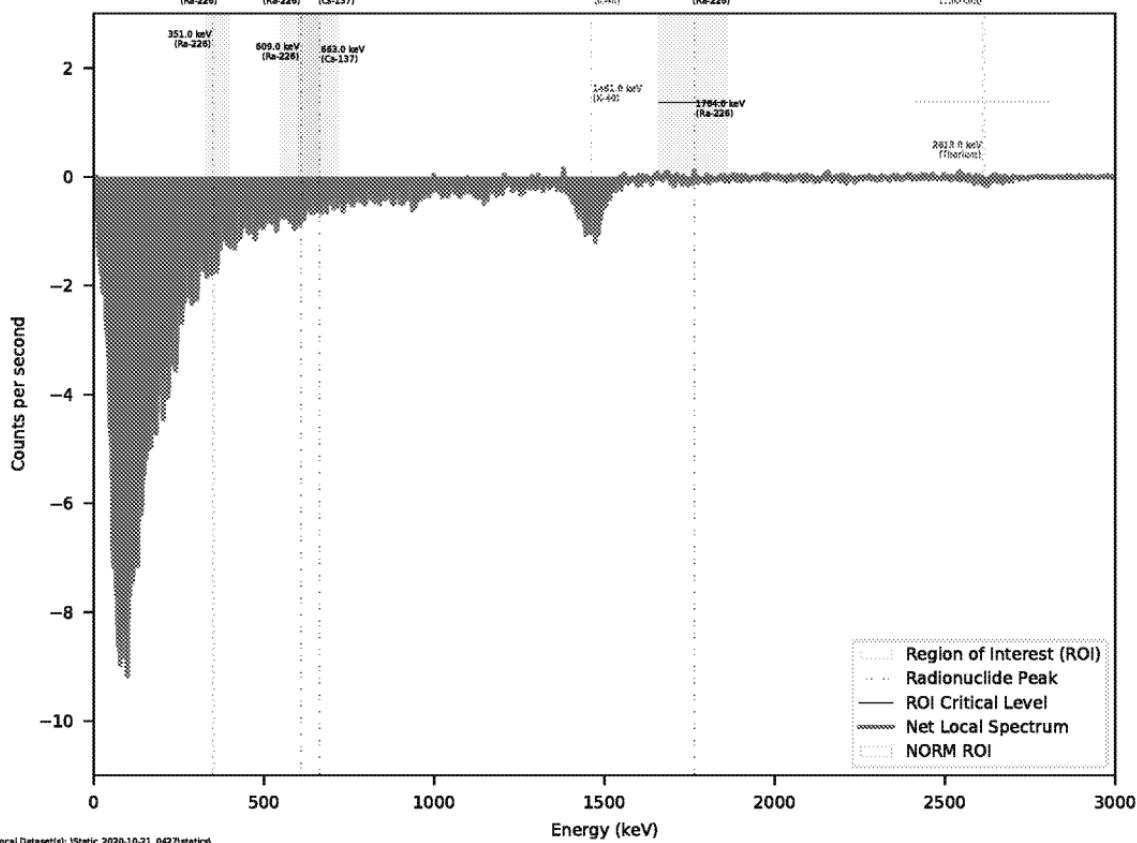
## Net Gamma Spectrum, Static Location: 24

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# Net Gamma Spectrum, Static Location: 25

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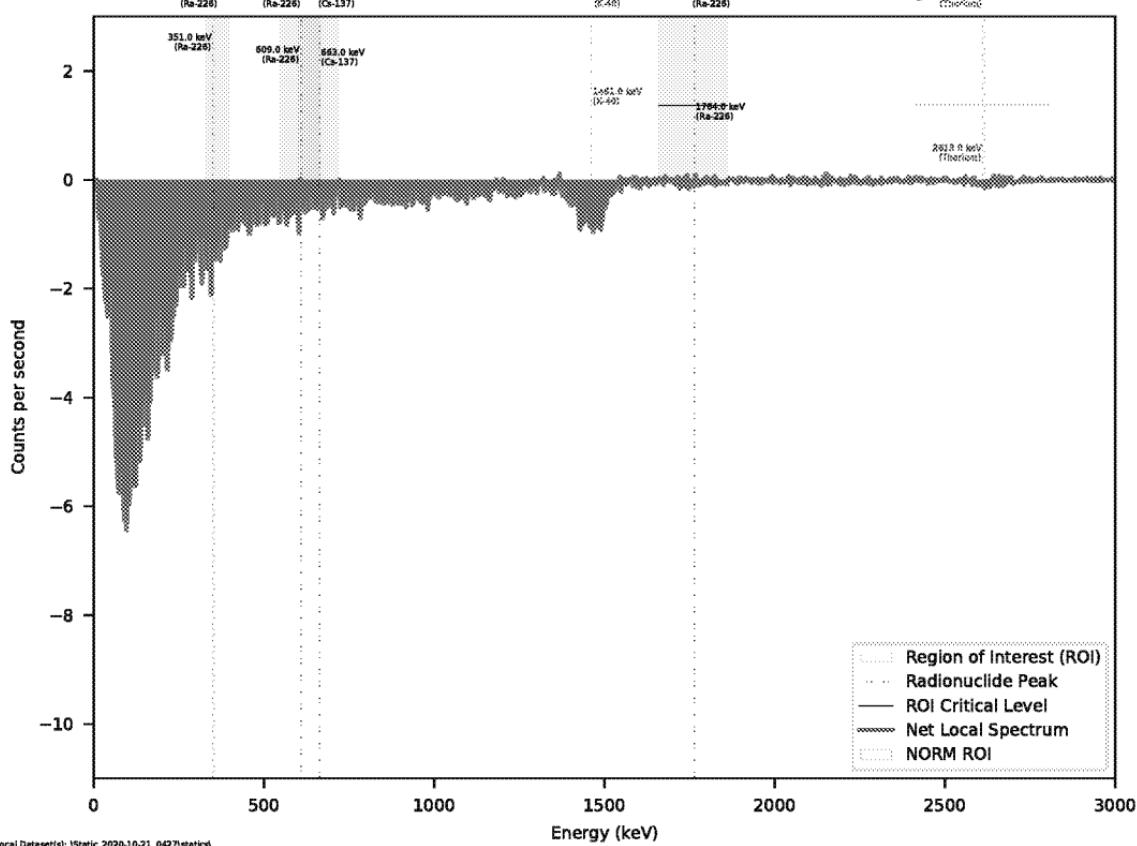
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Background Dataset(s): RSII\_SoilRBA\_Static.csv

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ED\_006360A\_00000356-00038

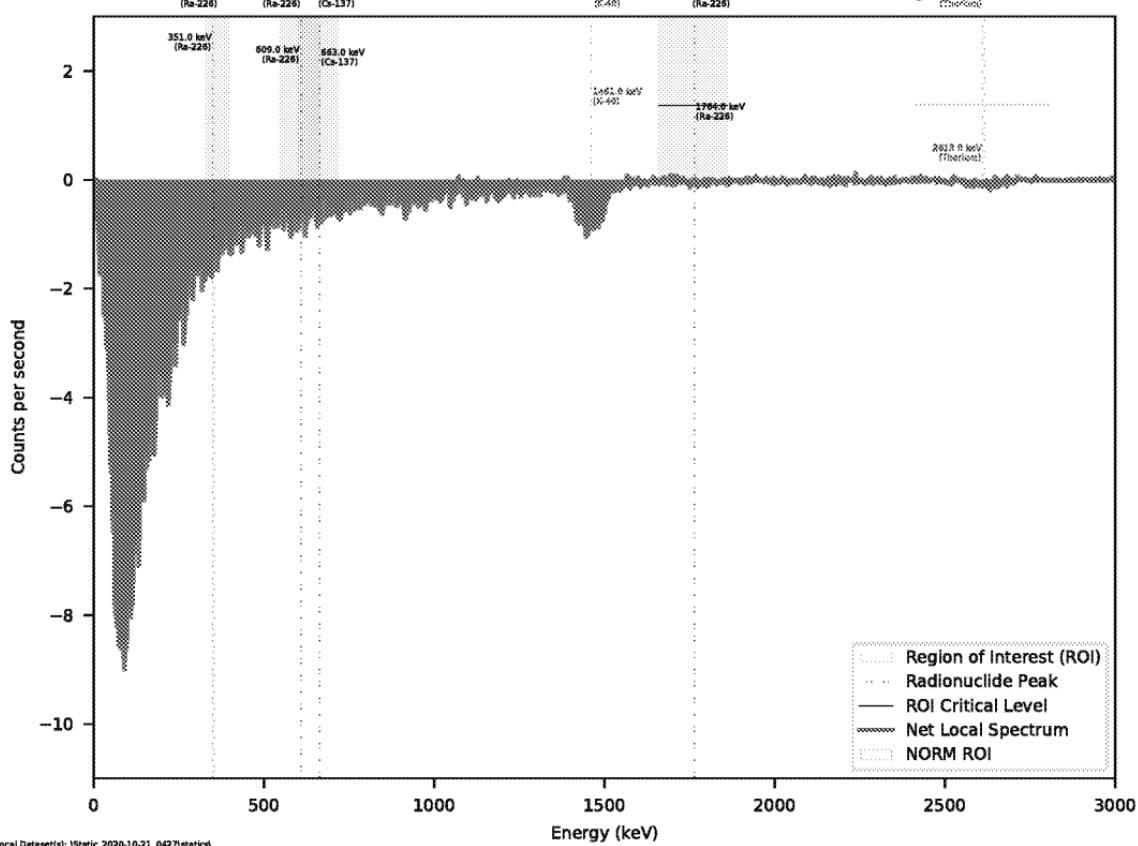
## Net Gamma Spectrum, Static Location: 26

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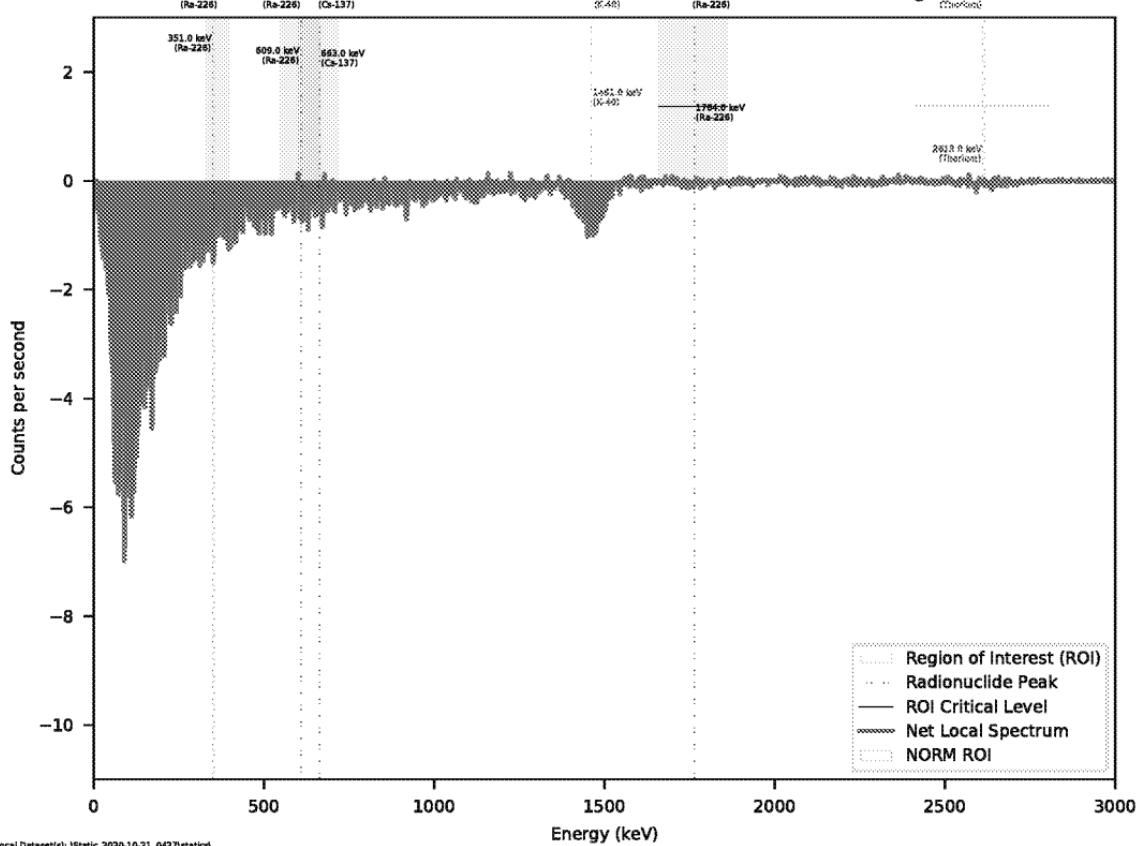
## Net Gamma Spectrum, Static Location: 27

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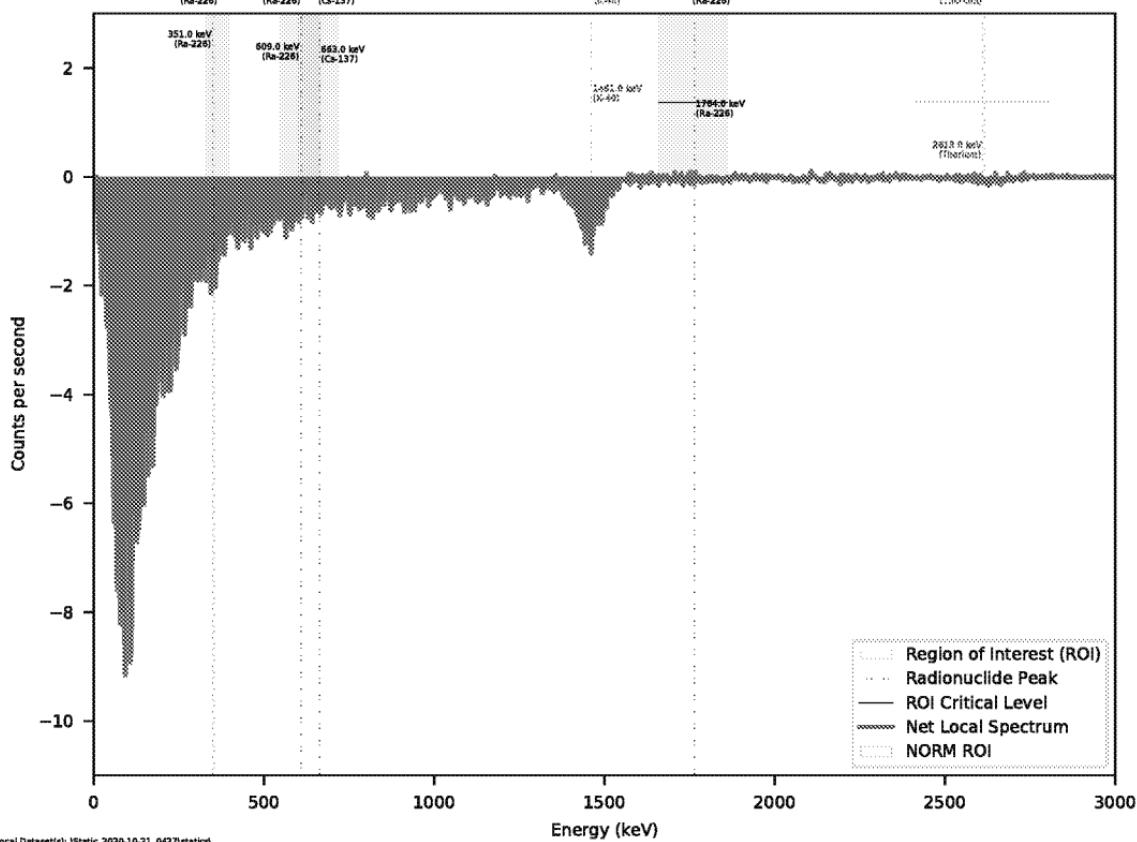
## Net Gamma Spectrum, Static Location: 28

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## Net Gamma Spectrum, Static Location: 29

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## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40093-1  
Laboratory Sample Delivery Group: GJ46599781  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 3

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

*Authorized for release by:*  
4/13/2021 2:48:20 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

Review your project  
results through

**Total Access**

Have a Question?

Ask—  
The  
Expert

Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Job ID: 160-40093-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40093-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Sample HPPG-SFU-TU098A-015 (160-40093-17) was initially prepped in a 100 mL solid geometry due to insufficient volume. It was determined that the sample was able to be disaggregated and homogenized to fill a tuna can geometry. This sample was removed

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

## Job ID: 160-40093-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

from this job and will be reported using a tuna can geometry with 21 days of ingrowth in job 160-40093-2.

Revision 2- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Revision 3- Additional information requested in case narrative for total strontium

### RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 15.1 C.

### TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-SFU-TU098A-001 (160-40093-3), HPPG-SFU-TU098A-011 (160-40093-13) and HPPG-SFU-TU098A-021 (160-40093-23) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/28/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU098A-001 (160-40093-3), HPPG-SFU-TU098A-011 (160-40093-13) and HPPG-SFU-TU098A-021 (160-40093-23).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-013 (160-40093-1), HPPG-F-014 (160-40093-2), HPPG-SFU-TU098A-001 (160-40093-3), HPPG-SFU-TU098A-002 (160-40093-4), HPPG-SFU-TU098A-003 (160-40093-5), HPPG-SFU-TU098A-004 (160-40093-6), HPPG-SFU-TU098A-005 (160-40093-7), HPPG-SFU-TU098A-006 (160-40093-8), HPPG-SFU-TU098A-007 (160-40093-9), HPPG-SFU-TU098A-008 (160-40093-10), HPPG-SFU-TU098A-009 (160-40093-11), HPPG-SFU-TU098A-010 (160-40093-12), HPPG-SFU-TU098A-011 (160-40093-13), HPPG-SFU-TU098A-012 (160-40093-14), HPPG-SFU-TU098A-013 (160-40093-15), HPPG-SFU-TU098A-014 (160-40093-16), HPPG-SFU-TU098A-016 (160-40093-18), HPPG-SFU-TU098A-017 (160-40093-19), HPPG-SFU-TU098A-018 (160-40093-20), HPPG-SFU-TU098A-019 (160-40093-21), HPPG-SFU-TU098A-020 (160-40093-22), HPPG-SFU-TU098A-021 (160-40093-23), HPPG-SFU-TU098A-022 (160-40093-24), HPPG-SFU-TU098A-023 (160-40093-25), HPPG-SFU-TU098A-024 (160-40093-26) and HPPG-SFU-TU098A-025 (160-40093-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 10/28/2020, prepared on 11/04/2020 and 11/08/2020 and analyzed on 11/25/2020, 11/30/2020 and 12/02/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

### Job ID: 160-40093-1 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 488229

The radium-226 detection goal of .2 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The radium-226 activity in the sample is below to the DLC and RL. (MB 160-488229/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (160-40093-A-15-C DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The method blank (MB) z-score associated with Prep Batch 160-488229 is within limits and is stored in the level IV raw data. (MB 160-488229/1-A)

Gamma prep batch 488209

The method blank (MB) z-score associated with Prep Batch 160-488209 is within limits and is stored in the level IV raw data. (MB 160-488209/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

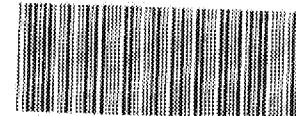
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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0790  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

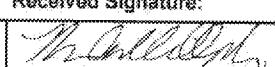
Sample Tech(s):

Project Number: 501197 Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action Project Location: San Francisco, CA Purchase Order #: 1159058 Shipment/Pickup Date: 10/22/2020 Waybill Number: 4957 0225 4384 Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046				Analysis Requested Gamma Spec (EPA 8011M) - Full 21 day in ground gamma				 160-40093 Chain of Custody			
Lab Contact Name/ph #				Rhaeda Ridenbower (314)298-8566				Dose Rate uR/Hr	Evidence Bag ID	Comment	
Sample ID	Collection Information			Matrix	# of Containers	Preservatives (water)					
	Date	Time	Method			Preservatives (soil)					
HPPG-F-013	10/21/2020	10:39	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-F-014	10/21/2020	12:38	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-001	10/21/2020	10:30	G	SO	1	16 oz. plastic jar	X	X		4	GJ46599781
HPPG-SFU-TU098A-002	10/21/2020	10:34	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-003	10/21/2020	10:39	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-004	10/21/2020	10:43	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-005	10/21/2020	10:47	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-006	10/21/2020	11:01	G	SO	1	16 oz. plastic jar	X			4	GJ46599781

## Special Instructions:

21 day ingrowth results only  
Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turnaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I <input type="checkbox"/>	II <input type="checkbox"/>	III <input type="checkbox"/>	Project Specific
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; SO = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening									

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/21/2020 17:25	Locked Storage (RKilpack)		10/21/2020 17:25
Locked Storage (RKilpack)		10/22/2020 15:41	Devin Lewis		10/22/2020 15:41
Devin Lewis		10/22/2020 16:18	SHIPPED TO LAB VIA FE		10/26/2020 08:38

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



ED\_006360A\_00000356-00048



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-9769  
Address: 3005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

	Collection information				Matrix	# of Containers	Preservatives (water)	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method	Container Type				Preservatives (soil)	Shodium-SO <sub>4</sub> (EPA 905 MOD)	Day in Growth Gamma (EPA 901, 1 M) - Full 21				
HPPG-SFU-TU098A-007	10/21/2020	11:05	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-008	10/21/2020	11:09	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-009	10/21/2020	11:12	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-010	10/21/2020	11:14	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-011	10/21/2020	11:17	G	SO	1	1	16 oz. plastic jar	X	X			4	GJ46599781	
HPPG-SFU-TU098A-012	10/21/2020	11:22	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-013	10/21/2020	11:31	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-014	10/21/2020	11:39	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-015	10/21/2020	11:45	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-016	10/21/2020	11:51	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-017	10/21/2020	12:38	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-018	10/21/2020	12:43	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-019	10/21/2020	12:46	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-020	10/21/2020	12:48	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-021	10/21/2020	12:52	G	SO	1	1	16 oz. plastic jar	X	X			4	GJ46599781	
HPPG-SFU-TU098A-022	10/21/2020	12:55	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	
HPPG-SFU-TU098A-023	10/21/2020	12:59	G	SO	1	1	16 oz. plastic jar	X				4	GJ46599781	



APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

## CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

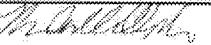
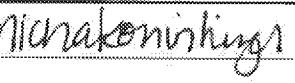
Page 3 of 4

<p><b>Project Number:</b> 501197</p> <p><b>Project Name:</b> Hunters Point Naval Shipyard: Parcel G Remedial Action</p> <p><b>Project Location:</b> San Francisco, CA</p> <p><b>Purchase Order #:</b> 1159058</p> <p><b>Shipment/Pickup Date:</b> 10/22/2020</p> <p><b>Waybill Number:</b> 4457 0225 41384</p> <p><b>Lab Destination:</b> Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046</p>				<p><b>Analysis Requested</b></p> <p>Groundwater (EPA 9011 M) - Field 21</p> <p>Ground Spec (EPA 9011 M) - Field Gamma</p> <p>Solvent 90 (EPA 9011 M)</p>				<b>Dose Rate</b> uR/Hr	<b>Evidence Bag ID</b>	<b>Comment</b>	
<p><b>Lab Contact Name/ph #:</b> Rhueda Ridenbower (314)298-8566</p>				<b>Preservatives (water)</b>	<b>Preservatives (soil)</b>	<b>Container Type</b>					
<b>Sample ID</b>	<b>Date</b>	<b>Time</b>	<b>Method</b>	Matrix	# of Containers						
HPPG-SFU-TU098A-024	10/21/2020	13:01	G	SO	1	16 oz. plastic jar	X			4	GJ46599781
HPPG-SFU-TU098A-026	10/21/2020	13:03	G	SO	1	16 oz. plastic jar	X			4	GJ46599781



# All Transfers for COC 501197RSY-012

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/21/2020 17:25	Locked Storage (RKillpack)		10/21/2020 17:25
Locked Storage (RKillpack)		10/22/2020 15:41	Devin Lewis		10/22/2020 15:41
Devin Lewis		10/22/2020 16:18	via <small>SHIPPEDTOLAB</small> e		10/26/2020 08:38

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40093-1  
SDG Number: GJ46599781**Login Number:** 40093**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Korrinhizer, Micha L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy

None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40093-1	HPPG-F-013	Solid	10/21/20 10:39	10/26/20 08:38	
160-40093-2	HPPG-F-014	Solid	10/21/20 12:38	10/26/20 08:38	
160-40093-3	HPPG-SFU-TU098A-001	Solid	10/21/20 10:30	10/26/20 08:38	
160-40093-4	HPPG-SFU-TU098A-002	Solid	10/21/20 10:34	10/26/20 08:38	
160-40093-5	HPPG-SFU-TU098A-003	Solid	10/21/20 10:39	10/26/20 08:38	
160-40093-6	HPPG-SFU-TU098A-004	Solid	10/21/20 10:43	10/26/20 08:38	
160-40093-7	HPPG-SFU-TU098A-005	Solid	10/21/20 10:47	10/26/20 08:38	
160-40093-8	HPPG-SFU-TU098A-006	Solid	10/21/20 11:01	10/26/20 08:38	
160-40093-9	HPPG-SFU-TU098A-007	Solid	10/21/20 11:05	10/26/20 08:38	
160-40093-10	HPPG-SFU-TU098A-008	Solid	10/21/20 11:09	10/26/20 08:38	
160-40093-11	HPPG-SFU-TU098A-009	Solid	10/21/20 11:12	10/26/20 08:38	
160-40093-12	HPPG-SFU-TU098A-010	Solid	10/21/20 11:14	10/26/20 08:38	
160-40093-13	HPPG-SFU-TU098A-011	Solid	10/21/20 11:17	10/26/20 08:38	
160-40093-14	HPPG-SFU-TU098A-012	Solid	10/21/20 11:22	10/26/20 08:38	
160-40093-15	HPPG-SFU-TU098A-013	Solid	10/21/20 11:31	10/26/20 08:38	
160-40093-16	HPPG-SFU-TU098A-014	Solid	10/21/20 11:39	10/26/20 08:38	
160-40093-18	HPPG-SFU-TU098A-016	Solid	10/21/20 11:51	10/26/20 08:38	
160-40093-19	HPPG-SFU-TU098A-017	Solid	10/21/20 12:38	10/26/20 08:38	
160-40093-20	HPPG-SFU-TU098A-018	Solid	10/21/20 12:43	10/26/20 08:38	
160-40093-21	HPPG-SFU-TU098A-019	Solid	10/21/20 12:46	10/26/20 08:38	
160-40093-22	HPPG-SFU-TU098A-020	Solid	10/21/20 12:48	10/26/20 08:38	
160-40093-23	HPPG-SFU-TU098A-021	Solid	10/21/20 12:52	10/26/20 08:38	
160-40093-24	HPPG-SFU-TU098A-022	Solid	10/21/20 12:55	10/26/20 08:38	
160-40093-25	HPPG-SFU-TU098A-023	Solid	10/21/20 12:59	10/26/20 08:38	
160-40093-26	HPPG-SFU-TU098A-024	Solid	10/21/20 13:01	10/26/20 08:38	
160-40093-27	HPPG-SFU-TU098A-025	Solid	10/21/20 13:03	10/26/20 08:38	

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-F-013**

Date Collected: 10/21/20 10:39  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40093-1**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.153	U	0.271	0.272		0.254	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Actinium 228</b>	<b>0.457</b>		0.137	0.145		0.0371	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Bismuth-212	-0.202	U	0.568	0.568		0.450	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Bismuth-214</b>	<b>0.449</b>		0.106	0.116		0.0371	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Cesium-137	-0.0247	U	0.0583	0.0584	0.0700	0.0463	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Lead-210	0.206	U		1.16		0.946	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Lead-212</b>	<b>0.378</b>		0.0725	0.0875		0.0341	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Lead-214</b>	<b>0.349</b>		0.0819	0.0896		0.0587	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Potassium-40</b>	<b>6.47</b>		1.01	1.21		0.236	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Protactinium-231	0.000	U	0.435	0.435		1.68	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Protactinium-234	0.0328	U	0.0248	0.0250		0.174	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Radium-226</b>	<b>0.449</b>		0.106	0.116	0.200	0.0371	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Radium-228</b>	<b>0.457</b>		0.137	0.145		0.0371	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Thallium-208</b>	<b>0.182</b>		0.0412	0.0453		0.00664	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Thorium-232</b>	<b>0.457</b>		0.137	0.145		0.0371	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Thorium-234	0.152	U	0.334	0.334		0.741	pCi/g	11/04/20 17:38	11/25/20 19:22	1
<b>Thorium 228</b>	<b>0.378</b>		0.0725	0.0875		0.0341	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Uranium-235	0.000	U	0.0962	0.0962		0.303	pCi/g	11/04/20 17:38	11/25/20 19:22	1
Uranium-238	0.152	U	0.334	0.334		0.741	pCi/g	11/04/20 17:38	11/25/20 19:22	1

**Client Sample ID: HPPG-F-014**

Date Collected: 10/21/20 12:38  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40093-2**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.147	U	0.375	0.376		0.423	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Actinium 228</b>	<b>0.802</b>		0.153	0.173		0.0323	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Bismuth-212	-0.332	U	0.905	0.906		0.718	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Bismuth-214</b>	<b>0.434</b>		0.151	0.158		0.0687	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Cesium-137	-0.0185	U	0.0706	0.0706	0.0700	0.0565	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Lead-210	0.499	U	1.37	1.37		1.00	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Lead-212</b>	<b>0.508</b>		0.0958	0.109		0.0385	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Lead-214</b>	<b>0.409</b>		0.0986	0.107		0.0541	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Potassium-40</b>	<b>8.23</b>		1.33	1.57		0.125	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Protactinium-231	0.000	U	0.460	0.460		2.41	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Protactinium-234	0.135	U	0.237	0.238		0.239	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Radium-226</b>	<b>0.434</b>		0.151	0.158	0.200	0.0687	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Radium-228</b>	<b>0.802</b>		0.153	0.173		0.0323	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Thallium-208</b>	<b>0.155</b>		0.0686	0.0703		0.0289	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Thorium-232</b>	<b>0.802</b>		0.153	0.173		0.0323	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Thorium-234	0.750		0.603	0.609		0.453	pCi/g	11/04/20 17:38	11/25/20 19:23	1
<b>Thorium 228</b>	<b>0.508</b>		0.0958	0.109		0.0385	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Uranium-235	0.122	U	0.243	0.243		0.441	pCi/g	11/04/20 17:38	11/25/20 19:23	1
Uranium-238	0.750		0.603	0.609		0.453	pCi/g	11/04/20 17:38	11/25/20 19:23	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-001**

**Lab Sample ID: 160-40093-3**

Matrix: Solid

Date Collected: 10/21/20 10:30  
Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.000630	U	0.0516	0.0516	0.160	0.0424	pCi/g	11/06/20 11:01	11/26/20 10:45	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	88.8		40 - 110					11/06/20 11:01	11/26/20 10:45	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.239	U	0.458	0.459		0.264	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Actinium 228</b>	<b>0.293</b>		0.122	0.126		0.0380	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Bismuth-212	-0.393	U	0.610	0.611		0.474	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Bismuth-214</b>	<b>0.275</b>		0.0848	0.0895		0.0346	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Cesium-137	-0.00362	U	0.0361	0.0361	0.0700	0.0294	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Lead-210	-0.494	U	0.985	0.987		0.786	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Lead-212</b>	<b>0.230</b>		0.0540	0.0616		0.0263	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Lead-214</b>	<b>0.273</b>		0.0657	0.0716		0.0258	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Potassium-40</b>	<b>5.05</b>		0.806	0.957		0.0749	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Protactinium-231	0.000	U	0.483	0.483		1.36	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Protactinium-234	-0.00846	U	0.0192	0.0192		0.168	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Radium-226</b>	<b>0.275</b>		0.0848	0.0895	0.200	0.0346	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Radium-228</b>	<b>0.293</b>		0.122	0.126		0.0380	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Thallium-208</b>	<b>0.0983</b>		0.0325	0.0340		0.00889	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Thorium-232</b>	<b>0.293</b>		0.122	0.126		0.0380	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Thorium-234	-0.264	U	0.905	0.905		0.740	pCi/g	11/04/20 17:38	11/25/20 19:25	1
<b>Thorium 228</b>	<b>0.230</b>		0.0540	0.0616		0.0263	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Uranium-235	0.0791	U	0.158	0.158		0.299	pCi/g	11/04/20 17:38	11/25/20 19:25	1
Uranium-238	-0.264	U	0.905	0.905		0.740	pCi/g	11/04/20 17:38	11/25/20 19:25	1

**Client Sample ID: HPPG-SFU-TU098A-002**

**Lab Sample ID: 160-40093-4**

Date Collected: 10/21/20 10:34  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.147	U	0.266	0.267		0.200	pCi/g	11/04/20 17:38	11/25/20 19:24	1
<b>Actinium 228</b>	<b>0.553</b>		0.192	0.201		0.0387	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Bismuth-212	-0.515	U	1.06	1.06		0.830	pCi/g	11/04/20 17:38	11/25/20 19:24	1
<b>Bismuth-214</b>	<b>0.414</b>		0.128	0.135		0.0452	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Cesium-137	0.0410	U	0.0705	0.0707	0.0700	0.0538	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Lead-210	-0.567	U	1.47	1.47		1.23	pCi/g	11/04/20 17:38	11/25/20 19:24	1
<b>Lead-212</b>	<b>0.422</b>		0.177	0.185		0.0781	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Lead-214	0.0995	U	0.148	0.149		0.116	pCi/g	11/04/20 17:38	11/25/20 19:24	1
<b>Potassium-40</b>	<b>7.95</b>		1.62	1.81		0.337	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Protactinium-231	-1.08	U	3.15	3.15		2.55	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Protactinium-234	-0.130	U	0.346	0.346		0.281	pCi/g	11/04/20 17:38	11/25/20 19:24	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-002**

**Lab Sample ID: 160-40093-4**

Date Collected: 10/21/20 10:34  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Radium-226	0.414		0.128	0.135	0.200	0.0452	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Radium-228	0.553		0.192	0.201		0.0387	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Thallium-208	0.131		0.0952	0.0962		0.0479	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Thorium-232	0.553		0.192	0.201		0.0387	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Thorium-234	-0.141	U		1.10	1.10	0.903	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Thorium 228	0.422		0.177	0.185		0.0781	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Uranium-235	0.0528	U	0.406	0.406		0.327	pCi/g	11/04/20 17:38	11/25/20 19:24	1
Uranium-238	-0.141	U		1.10	1.10	0.903	pCi/g	11/04/20 17:38	11/25/20 19:24	1

**Client Sample ID: HPPG-SFU-TU098A-003**

**Lab Sample ID: 160-40093-5**

Date Collected: 10/21/20 10:39  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.129	U	0.285	0.285		0.267	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Actinium 228	0.296		0.163	0.166		0.134	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Bismuth-212	-0.478	U	0.773	0.774		0.596	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Bismuth-214	0.345		0.111	0.117		0.0485	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Cesium-137	0.0270	U	0.0561	0.0561	0.0700	0.0436	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-210	-0.562	U		1.72	1.72	1.43	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-212	0.459		0.0880	0.106		0.0379	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-214	0.450		0.113	0.122		0.0450	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Potassium-40	6.64		1.17	1.35		0.281	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Protactinium-231	0.587	U		1.66	1.66	1.82	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Protactinium-234	-0.0207	U	0.286	0.286		0.235	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Radium-226	0.345		0.111	0.117	0.200	0.0485	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Radium-228	0.296		0.163	0.166		0.134	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thallium-208	0.172		0.0535	0.0564		0.0183	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium-232	0.296		0.163	0.166		0.134	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium-234	0.439		0.556	0.558		0.422	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium 228	0.459		0.0880	0.106		0.0379	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Uranium-235	0.0259	U		0.241	0.241	0.394	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Uranium-238	0.439		0.556	0.558		0.422	pCi/g	11/04/20 17:38	11/25/20 19:27	1

**Client Sample ID: HPPG-SFU-TU098A-004**

**Lab Sample ID: 160-40093-6**

Date Collected: 10/21/20 10:43  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.208	U	0.469	0.469		0.385	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Actinium 228	0.492		0.238	0.245		0.0955	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Bismuth-212	0.000	U	0.192	0.192		0.623	pCi/g	11/04/20 17:38	11/25/20 19:27	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-004**

**Lab Sample ID: 160-40093-6**

Date Collected: 10/21/20 10:43  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.383		0.139	0.146		0.0563	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Cesium-137	-0.0515	U	0.0522	0.0526	0.0700	0.0654	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-210	-0.796	U	1.84	1.85		1.55	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-212	0.457		0.0967	0.111		0.0435	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Lead-214	0.403		0.125	0.134		0.0672	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Potassium-40	7.65		1.37	1.63		0.282	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Protactinium-231	-0.852	U	3.05	3.05		2.48	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Protactinium-234	0.112	U	0.249	0.249		0.241	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Radium-226	0.383		0.139	0.146	0.200	0.0563	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Radium-228	0.492		0.238	0.245		0.0955	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thallium-208	0.159		0.0521	0.0552		0.0155	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium-232	0.492		0.238	0.245		0.0955	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium-234	-0.171	U	0.995	0.996		0.824	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Thorium-228	0.457		0.0967	0.111		0.0435	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Uranium-235	0.0566	U	0.247	0.247		0.449	pCi/g	11/04/20 17:38	11/25/20 19:27	1
Uranium-238	-0.171	U	0.995	0.996		0.824	pCi/g	11/04/20 17:38	11/25/20 19:27	1

**Client Sample ID: HPPG-SFU-TU098A-005**

**Lab Sample ID: 160-40093-7**

Date Collected: 10/21/20 10:47  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.139	U	0.283	0.284		0.248	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Actinium 228	0.516		0.219	0.225		0.0688	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Bismuth-212	0.465	U	0.775	0.776		0.590	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Bismuth-214	0.274		0.107	0.111		0.0442	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Cesium-137	-0.00939	U	0.0468	0.0468	0.0700	0.0530	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Lead-210	0.763	U	1.35	1.35		0.865	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Lead-212	0.422		0.0804	0.0917		0.0309	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Lead-214	0.340		0.0973	0.103		0.0415	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Potassium-40	7.82		1.40	1.61		0.213	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Protactinium-231	-0.715	U	2.58	2.58		2.10	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Protactinium-234	0.0231	U	0.0450	0.0451		0.228	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Radium-226	0.274		0.107	0.111	0.200	0.0442	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Radium-228	0.516		0.219	0.225		0.0688	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Thallium-208	0.124		0.0427	0.0445		0.00846	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Thorium-232	0.516		0.219	0.225		0.0688	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Thorium-234	0.510		0.417	0.421		0.375	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Thorium 228	0.422		0.0804	0.0917		0.0309	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Uranium-235	0.111		0.155	0.155		0.111	pCi/g	11/04/20 17:38	11/25/20 19:52	1
Uranium-238	0.510		0.417	0.421		0.375	pCi/g	11/04/20 17:38	11/25/20 19:52	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-006**

**Lab Sample ID: 160-40093-8**

Date Collected: 10/21/20 11:01

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium-227	0.234	U	0.448	0.449		0.322	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Actinium 228</b>	<b>0.400</b>		0.165	0.170		0.0413	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Bismuth-212	0.394	U	0.762	0.763		0.578	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Bismuth-214</b>	<b>0.420</b>		0.169	0.175		0.0740	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Cesium-137	0.00564	U	0.0663	0.0663	0.0700	0.0535	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Lead-210	-0.326	U		1.42	1.42		1.02	pCi/g	11/04/20 17:38	11/25/20 19:51	1
<b>Lead-212</b>	<b>0.431</b>		0.0951	0.110		0.0396	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Lead-214</b>	<b>0.425</b>		0.140	0.147		0.0632	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Potassium-40</b>	<b>7.26</b>		1.48	1.66		0.279	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Protactinium-231	-0.0000001	U		2.68	2.68		2.21	pCi/g	11/04/20 17:38	11/25/20 19:51	1
Protactinium-234	0.0788	U	0.206	0.206		0.166	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Radium-226</b>	<b>0.420</b>		0.169	0.175	0.200	0.0740	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Radium-228</b>	<b>0.400</b>		0.165	0.170		0.0413	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Thallium-208</b>	<b>0.117</b>		0.0598	0.0610		0.0226	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
<b>Thorium-232</b>	<b>0.400</b>		0.165	0.170		0.0413	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Thorium-234	-0.178	U		1.03	1.03		0.850	pCi/g	11/04/20 17:38	11/25/20 19:51	1
<b>Thorium 228</b>	<b>0.431</b>		0.0951	0.110		0.0396	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Uranium-235	0.0554	U	0.192	0.192		0.263	pCi/g	11/04/20 17:38	11/25/20 19:51	1	
Uranium-238	-0.178	U		1.03	1.03		0.850	pCi/g	11/04/20 17:38	11/25/20 19:51	1

**Client Sample ID: HPPG-SFU-TU098A-007**

**Lab Sample ID: 160-40093-9**

Date Collected: 10/21/20 11:05

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.152	U	0.290	0.290		0.261	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Actinium 228</b>	<b>0.616</b>		0.146	0.159		0.0398	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Bismuth-212	0.239	U	0.596	0.597		0.470	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Bismuth-214</b>	<b>0.324</b>		0.104	0.110		0.0447	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Cesium-137	-0.00689	U	0.0468	0.0468	0.0700	0.0379	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Lead-210	0.552	U	1.29	1.30		1.04	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Lead-212</b>	<b>0.426</b>		0.0818	0.0987		0.0404	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Lead-214</b>	<b>0.381</b>		0.0940	0.102		0.0370	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Potassium-40</b>	<b>7.18</b>		1.10	1.32		0.254	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Protactinium-231	0.000	U	0.279	0.279		1.79	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Protactinium-234	0.0613	U	0.186	0.186		0.173	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Radium-226</b>	<b>0.324</b>		0.104	0.110	0.200	0.0447	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Radium-228</b>	<b>0.616</b>		0.146	0.159		0.0398	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Thallium-208</b>	<b>0.156</b>		0.0507	0.0532		0.0176	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Thorium-232</b>	<b>0.616</b>		0.146	0.159		0.0398	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Thorium-234	0.199	U	0.411	0.411		0.772	pCi/g	11/04/20 17:38	11/25/20 19:54	1
<b>Thorium 228</b>	<b>0.426</b>		0.0818	0.0987		0.0404	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Uranium-235	0.000	U	0.160	0.160		0.316	pCi/g	11/04/20 17:38	11/25/20 19:54	1
Uranium-238	0.199	U	0.411	0.411		0.772	pCi/g	11/04/20 17:38	11/25/20 19:54	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-008**

**Lab Sample ID: 160-40093-10**

Date Collected: 10/21/20 11:09

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.118	U	0.504	0.504		0.308	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Actinium 228</b>	<b>0.439</b>		0.266	0.270		0.116	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Bismuth-212	-0.0281	U	0.845	0.845		0.694	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Bismuth-214</b>	<b>0.461</b>		0.149	0.156		0.0655	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Cesium-137	-0.0404	U	0.0734	0.0735	0.0700	0.0572	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Lead-210</b>	<b>1.86</b>		1.59	1.61		1.01	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Lead-212</b>	<b>0.342</b>		0.0801	0.0877		0.0373	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Lead-214</b>	<b>0.245</b>		0.123	0.125		0.0617	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Potassium-40</b>	<b>7.31</b>		1.21	1.42		0.117	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Protactinium-231	-0.456	U	3.33	3.33		2.73	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Protactinium-234	-0.0975	U	0.295	0.296		0.240	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Radium-226</b>	<b>0.461</b>		0.149	0.156	0.200	0.0655	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Radium-228</b>	<b>0.439</b>		0.266	0.270		0.116	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Thallium-208</b>	<b>0.174</b>		0.0609	0.0634		0.0220	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Thorium-232</b>	<b>0.439</b>		0.266	0.270		0.116	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Thorium-234	0.406	U	0.522	0.524		0.416	pCi/g	11/04/20 17:38	11/25/20 19:57	1
<b>Thorium 228</b>	<b>0.342</b>		0.0801	0.0877		0.0373	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Uranium-235	0.000	U	0.221	0.221		0.423	pCi/g	11/04/20 17:38	11/25/20 19:57	1
Uranium-238	0.406	U	0.522	0.524		0.416	pCi/g	11/04/20 17:38	11/25/20 19:57	1

**Client Sample ID: HPPG-SFU-TU098A-009**

**Lab Sample ID: 160-40093-11**

Date Collected: 10/21/20 11:12

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0104	U	0.0600	0.0600		0.331	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Actinium 228</b>	<b>0.371</b>		0.122	0.127		0.0492	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Bismuth-212	0.385	U	0.642	0.643		0.498	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Bismuth-214</b>	<b>0.268</b>		0.0970	0.101		0.0450	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Cesium-137	-0.0193	U	0.0589	0.0589	0.0700	0.0314	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Lead-210	-0.625	U	1.21	1.21		0.965	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Lead-212</b>	<b>0.407</b>		0.0683	0.0862		0.0231	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Lead-214</b>	<b>0.357</b>		0.0806	0.0887		0.0449	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Potassium-40</b>	<b>8.35</b>		1.12	1.41		0.0868	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Protactinium-231	0.000	U	0.521	0.521		1.74	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Protactinium-234	-0.0141	U	0.0292	0.0292		0.187	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Radium-226</b>	<b>0.268</b>		0.0970	0.101	0.200	0.0450	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Radium-228</b>	<b>0.371</b>		0.122	0.127		0.0492	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Thallium-208</b>	<b>0.0839</b>		0.0625	0.0631		0.0308	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Thorium-232</b>	<b>0.371</b>		0.122	0.127		0.0492	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Thorium-234	-0.333	U	1.08	1.08		0.879	pCi/g	11/04/20 17:38	11/25/20 20:00	1
<b>Thorium 228</b>	<b>0.407</b>		0.0683	0.0862		0.0231	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Uranium-235	-0.160	U	0.428	0.428		0.348	pCi/g	11/04/20 17:38	11/25/20 20:00	1
Uranium-238	-0.333	U	1.08	1.08		0.879	pCi/g	11/04/20 17:38	11/25/20 20:00	1

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# Client Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40093-1  
 SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-010**
**Lab Sample ID: 160-40093-12**

Date Collected: 10/21/20 11:14

Matrix: Solid

Date Received: 10/26/20 08:38

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.192	U	0.390	0.390		0.364	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Actinium 228</b>	<b>0.551</b>		0.186	0.195		0.0353	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Bismuth-212	0.470	U	0.818	0.820		0.627	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Bismuth-214</b>	<b>0.335</b>		0.108	0.114		0.0412	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Cesium-137	-0.0253	U	0.0701	0.0701	0.0700	0.0554	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Lead-210	-0.241	U	1.30	1.30		1.07	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Lead-212</b>	<b>0.334</b>		0.102	0.111		0.0618	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Lead-214</b>	<b>0.334</b>		0.0999	0.106		0.0364	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Potassium-40</b>	<b>7.60</b>		1.38	1.58		0.145	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Protactinium-231	0.748	U	1.89	1.89		2.08	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Protactinium-234	0.135	U	0.241	0.241		0.230	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Radium-226</b>	<b>0.335</b>		0.108	0.114	0.200	0.0412	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Radium-228</b>	<b>0.551</b>		0.186	0.195		0.0353	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Thallium-208</b>	<b>0.141</b>		0.0651	0.0667		0.0283	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Thorium-232</b>	<b>0.551</b>		0.186	0.195		0.0353	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Thorium-234	-0.0957	U	1.33	1.33		1.09	pCi/g	11/04/20 17:38	11/25/20 19:58	1
<b>Thorium 228</b>	<b>0.334</b>		0.102	0.111		0.0618	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Uranium-235	-0.0206	U	0.704	0.704		0.403	pCi/g	11/04/20 17:38	11/25/20 19:58	1
Uranium-238	-0.0957	U	1.33	1.33		1.09	pCi/g	11/04/20 17:38	11/25/20 19:58	1

**Client Sample ID: HPPG-SFU-TU098A-011**
**Lab Sample ID: 160-40093-13**

Date Collected: 10/21/20 11:17

Matrix: Solid

Date Received: 10/26/20 08:38

**Method: 905.0 - Total Beta Strontium (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0228	U	0.0634	0.0634	0.160	0.0503	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	90.2		40 - 110					11/06/20 11:01	11/26/20 10:48	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.216	U	0.430	0.431		0.280	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Actinium 228</b>	<b>0.508</b>		0.171	0.178		0.103	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Bismuth-212	0.0128	U	0.642	0.642		0.528	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Bismuth-214</b>	<b>0.407</b>		0.103	0.112		0.0379	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Cesium-137	0.0196	U	0.0457	0.0458	0.0700	0.0354	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Lead-210	0.672	U	1.33	1.33		0.869	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Lead-212</b>	<b>0.396</b>		0.0875	0.101		0.0438	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Lead-214</b>	<b>0.342</b>		0.0973	0.104		0.0460	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Potassium-40</b>	<b>6.27</b>		1.13	1.30		0.279	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Protactinium-231	-0.795	U	2.72	2.72		2.22	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Protactinium-234	0.00263	U	0.00430	0.00431		0.189	pCi/g	11/04/20 17:38	11/25/20 20:02	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-011**

**Lab Sample ID: 160-40093-13**

Date Collected: 10/21/20 11:17  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Radium-226	0.407		0.103	0.112	0.200	0.0379	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Radium-228	0.508		0.171	0.178		0.103	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Thallium-208	0.132		0.0638	0.0653		0.0282	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Thorium-232	0.508		0.171	0.178		0.103	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Thorium-234	-0.285	U	0.985	0.986		0.819	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Thorium 228</b>	<b>0.396</b>		0.0875	0.101		0.0438	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Uranium-235	0.0712	U	0.490	0.491		0.402	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Uranium-238	-0.285	U	0.985	0.986		0.819	pCi/g	11/04/20 17:38	11/25/20 20:02	1

**Client Sample ID: HPPG-SFU-TU098A-012**

**Lab Sample ID: 160-40093-14**

Date Collected: 10/21/20 11:22  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.220	U	0.430	0.431		0.263	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Actinium 228</b>	<b>0.456</b>		0.161	0.169		0.0641	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Bismuth-212	-0.684	U	1.29	1.29		1.02	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Bismuth-214</b>	<b>0.440</b>		0.147	0.156		0.0595	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Cesium-137	-0.00395	U	0.0860	0.0860	0.0700	0.0643	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Lead-210	0.658	U	1.38	1.38		1.08	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Lead-212</b>	<b>0.361</b>		0.102	0.111		0.0582	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Lead-214</b>	<b>0.527</b>		0.152	0.164		0.0604	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Potassium-40</b>	<b>7.19</b>		1.36	1.59		0.294	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Protactinium-231	-0.809	U	3.15	3.16		2.57	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Protactinium-234	-0.0319	U	0.322	0.322		0.265	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Radium-226</b>	<b>0.440</b>		0.147	0.156	0.200	0.0595	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Radium-228</b>	<b>0.456</b>		0.161	0.169		0.0641	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Thallium-208	0.207		0.0687	0.0727		0.0239	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Thorium-232</b>	<b>0.456</b>		0.161	0.169		0.0641	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Thorium-234	-0.915	U	0.940	0.946		0.689	pCi/g	11/04/20 17:38	11/25/20 20:55	1
<b>Thorium 228</b>	<b>0.361</b>		0.102	0.111		0.0582	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Uranium-235	-0.0120	U	0.498	0.498		0.451	pCi/g	11/04/20 17:38	11/25/20 20:55	1
Uranium-238	-0.915	U	0.940	0.946		0.689	pCi/g	11/04/20 17:38	11/25/20 20:55	1

**Client Sample ID: HPPG-SFU-TU098A-013**

**Lab Sample ID: 160-40093-15**

Date Collected: 10/21/20 11:31  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.210	U	0.590	0.591		0.356	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Actinium 228</b>	<b>0.578</b>		0.212	0.222		0.0673	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Bismuth-212	0.000	U	0.210	0.210		0.734	pCi/g	11/04/20 17:38	11/25/20 20:02	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-013**

**Lab Sample ID: 160-40093-15**

Date Collected: 10/21/20 11:31

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-214	0.0819	U	0.231	0.231		0.176	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Cesium-137	0.0283	U	0.0672	0.0673	0.0700	0.0522	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Lead-210</b>	<b>1.46</b>		1.85	1.86		1.12	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Lead-212</b>	<b>0.413</b>		0.109	0.120		0.0607	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Lead-214</b>	<b>0.416</b>		0.118	0.127		0.0658	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Potassium-40</b>	<b>8.62</b>		1.52	1.82		0.308	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Protactinium-231	0.450	U	1.77	1.77		2.81	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Protactinium-234	-0.133	U	0.407	0.407		0.332	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Radium-226	0.0819	U	0.231	0.231	0.200	0.176	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Radium-228</b>	<b>0.578</b>		0.212	0.222		0.0673	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Thallium-208</b>	<b>0.179</b>		0.0664	0.0696		0.0245	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Thorium-232</b>	<b>0.578</b>		0.212	0.222		0.0673	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Thorium-234	-0.262	U	1.20	1.20		0.996	pCi/g	11/04/20 17:38	11/25/20 20:02	1
<b>Thorium 228</b>	<b>0.413</b>		0.109	0.120		0.0607	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Uranium-235	0.135	U	0.672	0.673		0.550	pCi/g	11/04/20 17:38	11/25/20 20:02	1
Uranium-238	-0.262	U	1.20	1.20		0.996	pCi/g	11/04/20 17:38	11/25/20 20:02	1

**Client Sample ID: HPPG-SFU-TU098A-014**

**Lab Sample ID: 160-40093-16**

Date Collected: 10/21/20 11:39

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.262	U	0.551	0.552		0.354	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Actinium 228</b>	<b>0.364</b>		0.144	0.149		0.0551	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Bismuth-212	0.000	U	0.491	0.491		0.467	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Bismuth-214</b>	<b>0.350</b>		0.110	0.116		0.0465	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Cesium-137	0.00855	U	0.0658	0.0658	0.0700	0.0535	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Lead-210	-0.732	U	1.52	1.52		1.27	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Lead-212</b>	<b>0.427</b>		0.0843	0.101		0.0397	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Lead-214</b>	<b>0.403</b>		0.100	0.109		0.0576	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Potassium-40</b>	<b>6.30</b>		1.09	1.26		0.257	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Protactinium-231	0.538	U	1.68	1.68		1.84	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Protactinium-234	-0.00195	U	0.00174	0.00175		0.244	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Radium-226</b>	<b>0.350</b>		0.110	0.116	0.200	0.0465	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Radium-228</b>	<b>0.364</b>		0.144	0.149		0.0551	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Thallium-208	0.141		0.0422	0.0447		0.0128	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Thorium-232</b>	<b>0.364</b>		0.144	0.149		0.0551	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Thorium-234</b>	<b>0.537</b>		0.505	0.508		0.394	pCi/g	11/04/20 13:46	12/02/20 12:25	1
<b>Thorium 228</b>	<b>0.427</b>		0.0843	0.101		0.0397	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Uranium-235	0.104	U	0.333	0.333		0.270	pCi/g	11/04/20 13:46	12/02/20 12:25	1
Uranium-238	0.537		0.505	0.508		0.394	pCi/g	11/04/20 13:46	12/02/20 12:25	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-016**

**Lab Sample ID: 160-40093-18**

Matrix: Solid

Date Collected: 10/21/20 11:51  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0297	U	0.543	0.543		0.297	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Actinium 228</b>	<b>0.501</b>		0.141	0.149		0.107	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Bismuth-212	0.237	U	0.447	0.448		0.324	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Bismuth-214</b>	<b>0.426</b>		0.111	0.119		0.0286	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Cesium-137	-0.00132	U	0.0496	0.0496	0.0700	0.0410	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Lead-210</b>	<b>2.17</b>		1.51	1.54		0.889	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Lead-212</b>	<b>0.406</b>		0.0822	0.0925		0.0348	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Lead-214</b>	<b>0.422</b>		0.112	0.120		0.0410	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Potassium-40</b>	<b>7.92</b>		1.43	1.64		0.218	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Protactinium-231	0.529	U	1.80	1.80		1.97	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Protactinium-234	0.0720	U	0.104	0.105		0.233	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Radium-226</b>	<b>0.426</b>		0.111	0.119	0.200	0.0286	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Radium-228</b>	<b>0.501</b>		0.141	0.149		0.107	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Thallium-208</b>	<b>0.183</b>		0.0519	0.0551		0.00864	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Thorium-232</b>	<b>0.501</b>		0.141	0.149		0.107	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Thorium-234	-0.270	U	0.809	0.810		0.674	pCi/g	11/04/20 13:46	12/02/20 12:42	1
<b>Thorium 228</b>	<b>0.406</b>		0.0822	0.0925		0.0348	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Uranium-235	0.0981	U	0.476	0.476		0.388	pCi/g	11/04/20 13:46	12/02/20 12:42	1
Uranium-238	-0.270	U	0.809	0.810		0.674	pCi/g	11/04/20 13:46	12/02/20 12:42	1

**Client Sample ID: HPPG-SFU-TU098A-017**

**Lab Sample ID: 160-40093-19**

Matrix: Solid

Date Collected: 10/21/20 12:38  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.400		0.403	0.406		0.219	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Actinium 228</b>	<b>0.526</b>		0.189	0.196		0.0898	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Bismuth-212	0.267	U	0.707	0.707		0.548	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Bismuth-214</b>	<b>0.422</b>		0.165	0.170		0.0668	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Cesium-137	0.00932	U	0.0633	0.0633	0.0700	0.0386	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Lead-210	-0.0386	U	1.32	1.32		0.936	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Lead-212</b>	<b>0.484</b>		0.0976	0.116		0.0393	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Lead-214</b>	<b>0.322</b>		0.113	0.118		0.0569	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Potassium-40</b>	<b>5.73</b>		1.30	1.43		0.268	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Protactinium-231	0.553	U	2.11	2.11		1.71	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Protactinium-234	0.0742	U	0.220	0.220		0.159	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Radium-226</b>	<b>0.422</b>		0.165	0.170	0.200	0.0668	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Radium-228</b>	<b>0.526</b>		0.189	0.196		0.0898	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Thallium-208</b>	<b>0.123</b>		0.0591	0.0604		0.0237	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Thorium-232</b>	<b>0.526</b>		0.189	0.196		0.0898	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Thorium-234	0.780		0.469	0.477		0.346	pCi/g	11/04/20 13:46	12/02/20 12:43	1
<b>Thorium 228</b>	<b>0.484</b>		0.0976	0.116		0.0393	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Uranium-235	0.158		0.166	0.167		0.0948	pCi/g	11/04/20 13:46	12/02/20 12:43	1
Uranium-238	0.780		0.469	0.477		0.346	pCi/g	11/04/20 13:46	12/02/20 12:43	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-018**

**Lab Sample ID: 160-40093-20**

Matrix: Solid

Date Collected: 10/21/20 12:43  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0273	U	0.0719	0.0720		0.425	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Actinium 228</b>	<b>0.471</b>		0.270	0.275		0.122	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Bismuth-212	0.0389	U	0.869	0.869		0.712	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Bismuth-214</b>	<b>0.378</b>		0.112	0.120		0.0371	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Cesium-137	-0.0202	U	0.0473	0.0474	0.0700	0.0478	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Lead-210</b>	<b>1.62</b>		1.53	1.54		0.946	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Lead-212</b>	<b>0.316</b>		0.0887	0.0962		0.0482	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Lead-214</b>	<b>0.395</b>		0.117	0.125		0.0485	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Potassium-40</b>	<b>5.33</b>		1.31	1.44		0.415	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Protactinium-231	-0.0830	U	2.99	2.99		2.46	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Protactinium-234	0.128	U	0.151	0.152		0.256	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Radium-226</b>	<b>0.378</b>		0.112	0.120	0.200	0.0371	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Radium-228</b>	<b>0.471</b>		0.270	0.275		0.122	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Thallium-208</b>	<b>0.0618</b>		0.0739	0.0743		0.0412	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Thorium-232</b>	<b>0.471</b>		0.270	0.275		0.122	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Thorium-234	-0.926	U	0.708	0.717		0.634	pCi/g	11/04/20 13:46	12/02/20 12:49	1
<b>Thorium 228</b>	<b>0.316</b>		0.0887	0.0962		0.0482	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Uranium-235	-0.203	U	0.144	0.146		0.493	pCi/g	11/04/20 13:46	12/02/20 12:49	1
Uranium-238	-0.926	U	0.708	0.717		0.634	pCi/g	11/04/20 13:46	12/02/20 12:49	1

**Client Sample ID: HPPG-SFU-TU098A-019**

**Lab Sample ID: 160-40093-21**

Matrix: Solid

Date Collected: 10/21/20 12:46  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.167	U	0.329	0.329		0.187	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Actinium 228</b>	<b>0.256</b>		0.121	0.123		0.0682	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Bismuth-212	-0.00874	U	0.416	0.416		0.342	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Bismuth-214</b>	<b>0.226</b>		0.0814	0.0847		0.0380	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Cesium-137	0.0144	U	0.0409	0.0409	0.0700	0.0324	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Lead-210	-0.539	U	1.19	1.19		0.958	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Lead-212</b>	<b>0.269</b>		0.0577	0.0674		0.0271	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Lead-214</b>	<b>0.285</b>		0.0968	0.101		0.0411	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Potassium-40</b>	<b>6.99</b>		0.982	1.22		0.210	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Protactinium-231	0.000	U	0.565	0.565		1.46	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Protactinium-234	0.0596	U	0.172	0.172		0.139	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Radium-226</b>	<b>0.226</b>		0.0814	0.0847	0.200	0.0380	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Radium-228</b>	<b>0.256</b>		0.121	0.123		0.0682	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Thallium-208</b>	<b>0.120</b>		0.0383	0.0403		0.0144	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Thorium-232</b>	<b>0.256</b>		0.121	0.123		0.0682	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Thorium-234	-0.278	U	0.359	0.360		0.734	pCi/g	11/04/20 13:46	12/02/20 12:54	1
<b>Thorium 228</b>	<b>0.269</b>		0.0577	0.0674		0.0271	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Uranium-235	-0.130	U	0.371	0.372		0.303	pCi/g	11/04/20 13:46	12/02/20 12:54	1
Uranium-238	-0.278	U	0.359	0.360		0.734	pCi/g	11/04/20 13:46	12/02/20 12:54	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-020**

**Lab Sample ID: 160-40093-22**

Matrix: Solid

Date Collected: 10/21/20 12:48  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium-227	-0.0223	U	0.630	0.630		0.333	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Actinium 228</b>	<b>0.716</b>		0.207	0.219		0.0338	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Bismuth-212	-0.194	U	0.773	0.774		0.618	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Bismuth-214</b>	<b>0.298</b>		0.138	0.141		0.0870	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Cesium-137	-0.0338	U	0.0598	0.0599	0.0700	0.0456	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Lead-210	-0.0541	U		1.48	1.48		1.21	pCi/g	11/04/20 13:46	12/02/20 12:57	1
<b>Lead-212</b>	<b>0.334</b>		0.0963	0.106		0.0569	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Lead-214</b>	<b>0.443</b>		0.126	0.134		0.0422	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Potassium-40</b>	<b>8.40</b>		1.42	1.66		0.139	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Protactinium-231	0.715	U	1.71	1.71		1.88	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Protactinium-234	0.0157	U	0.0267	0.0268		0.245	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Radium-226</b>	<b>0.298</b>		0.138	0.141	0.200	0.0870	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Radium-228</b>	<b>0.716</b>		0.207	0.219		0.0338	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Thallium-208</b>	<b>0.191</b>		0.0552	0.0586		0.0163	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Thorium-232</b>	<b>0.716</b>		0.207	0.219		0.0338	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Thorium-234	-0.474	U	0.809	0.811		1.01	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
<b>Thorium 228</b>	<b>0.334</b>		0.0963	0.106		0.0569	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Uranium-235	0.0688	U	0.180	0.180		0.399	pCi/g	11/04/20 13:46	12/02/20 12:57	1	
Uranium-238	-0.474	U	0.809	0.811		1.01	pCi/g	11/04/20 13:46	12/02/20 12:57	1	

**Client Sample ID: HPPG-SFU-TU098A-021**

**Lab Sample ID: 160-40093-23**

Matrix: Solid

Date Collected: 10/21/20 12:52  
Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0506	U	0.0570	0.0571	0.160	0.0512	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	90.4		40 - 110					11/06/20 11:01	11/26/20 10:48	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.344	U	0.622	0.623		0.396	pCi/g	11/04/20 13:46	12/02/20 12:58	1
<b>Actinium 228</b>	<b>0.471</b>		0.180	0.186		0.0671	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Bismuth-212	0.436	U	0.769	0.770		0.592	pCi/g	11/04/20 13:46	12/02/20 12:58	1
<b>Bismuth-214</b>	<b>0.452</b>		0.146	0.153		0.0578	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Cesium-137	-0.0426	U	0.0741	0.0742	0.0700	0.0575	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Lead-210	0.369	U	1.55	1.55		1.24	pCi/g	11/04/20 13:46	12/02/20 12:58	1
<b>Lead-212</b>	<b>0.455</b>		0.0952	0.112		0.0438	pCi/g	11/04/20 13:46	12/02/20 12:58	1
<b>Lead-214</b>	<b>0.409</b>		0.109	0.117		0.0656	pCi/g	11/04/20 13:46	12/02/20 12:58	1
<b>Potassium-40</b>	<b>7.05</b>		1.27	1.46		0.313	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Protactinium-231	0.554	U	1.78	1.78		1.95	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Protactinium-234	0.0948	U	0.270	0.270		0.227	pCi/g	11/04/20 13:46	12/02/20 12:58	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-021**

**Lab Sample ID: 160-40093-23**

Date Collected: 10/21/20 12:52

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Radium-226	0.452		0.146	0.153	0.200	0.0578	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Radium-228	0.471		0.180	0.186		0.0671	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Thallium-208	0.156		0.0626	0.0647		0.0259	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Thorium-232	0.471		0.180	0.186		0.0671	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Thorium-234	0.892		0.714	0.721		0.450	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Thorium 228	0.455		0.0952	0.112		0.0438	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Uranium-235	0.157 U		0.370	0.371		0.298	pCi/g	11/04/20 13:46	12/02/20 12:58	1
Uranium-238	0.892		0.714	0.721		0.450	pCi/g	11/04/20 13:46	12/02/20 12:58	1

**Client Sample ID: HPPG-SFU-TU098A-022**

**Lab Sample ID: 160-40093-24**

Date Collected: 10/21/20 12:55

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.0384	U	0.451	0.451		0.278	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Actinium 228	0.516		0.180	0.187		0.0364	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Bismuth-212	0.492 U		0.920	0.921		0.713	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Bismuth-214	0.506		0.122	0.132		0.0296	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Cesium-137	-0.0241 U		0.0441	0.0442	0.0700	0.0785	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Lead-210	0.644 U		1.53	1.54		0.995	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Lead-212	0.434		0.0886	0.0995		0.0397	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Lead-214	0.317		0.107	0.112		0.106	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Potassium-40	8.35		1.49	1.71		0.226	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Protactinium-231	0.235 U		1.38	1.38		2.13	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Protactinium-234	0.146 U		0.221	0.222		0.188	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Radium-226	0.506		0.122	0.132	0.200	0.0296	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Radium-228	0.516		0.180	0.187		0.0364	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Thallium-208	0.145		0.0511	0.0532		0.0154	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Thorium-232	0.516		0.180	0.187		0.0364	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Thorium-234	0.334 U		0.501	0.502		0.432	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Thorium 228	0.434		0.0886	0.0995		0.0397	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Uranium-235	0.127 U		0.280	0.281		0.316	pCi/g	11/04/20 13:46	12/02/20 13:15	1
Uranium-238	0.334 U		0.501	0.502		0.432	pCi/g	11/04/20 13:46	12/02/20 13:15	1

**Client Sample ID: HPPG-SFU-TU098A-023**

**Lab Sample ID: 160-40093-25**

Date Collected: 10/21/20 12:59

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	-0.296 U		0.655	0.656		0.392	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Actinium 228	0.345		0.244	0.246		0.102	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Bismuth-212	0.303 U		0.783	0.783		0.604	pCi/g	11/04/20 13:46	12/02/20 13:16	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-023**

**Lab Sample ID: 160-40093-25**

Matrix: Solid

Date Collected: 10/21/20 12:59  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-214	0.281		0.158	0.161		0.140	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Cesium-137	0.000681	U	0.0675	0.0675	0.0700	0.0550	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Lead-210	0.820	U	1.49	1.49		1.01	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Lead-212	0.368		0.0949	0.106		0.0430	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Lead-214	0.320		0.112	0.117		0.0745	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Potassium-40	5.64		1.38	1.50		0.304	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Protactinium-231	0.000	U	0.490	0.490		1.90	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Protactinium-234	0.0977	U	0.201	0.201		0.147	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Radium-226	0.281		0.158	0.161	0.200	0.140	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Radium-228	0.345		0.244	0.246		0.102	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Thallium-208	0.168		0.0569	0.0595		0.0106	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Thorium-232	0.345		0.244	0.246		0.102	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Thorium-234	-0.215	U	0.727	0.727		0.608	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Thorium-228	0.368		0.0949	0.106		0.0430	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Uranium-235	-0.0514	U	0.0883	0.0885		0.337	pCi/g	11/04/20 13:46	12/02/20 13:16	1
Uranium-238	-0.215	U	0.727	0.727		0.608	pCi/g	11/04/20 13:46	12/02/20 13:16	1

**Client Sample ID: HPPG-SFU-TU098A-024**

**Lab Sample ID: 160-40093-26**

Matrix: Solid

Date Collected: 10/21/20 13:01  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.0101	U	0.0226	0.0226		0.503	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Actinium 228	0.696		0.239	0.253		0.0729	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Bismuth-212	0.351	U	1.02	1.02		0.808	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Bismuth-214	0.397		0.151	0.158		0.0795	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Cesium-137	-0.0139	U	0.0657	0.0657	0.0700	0.0609	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Lead-210	1.22		1.62	1.63		1.09	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Lead-212	0.330		0.105	0.112		0.0601	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Lead-214	0.369		0.167	0.172		0.124	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Potassium-40	6.67		1.41	1.61		0.334	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Protactinium-231	0.912	U	3.00	3.00		2.43	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Protactinium-234	0.150	U	0.0949	0.0965		0.328	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Radium-226	0.397		0.151	0.158	0.200	0.0795	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Radium-228	0.696		0.239	0.253		0.0729	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Thallium-208	0.162		0.0796	0.0817		0.0338	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Thorium-232	0.696		0.239	0.253		0.0729	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Thorium-234	-1.07	U	0.786	0.797		1.03	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Thorium 228	0.330		0.105	0.112		0.0601	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Uranium-235	-0.0423	U	0.419	0.419		0.358	pCi/g	11/04/20 13:46	12/02/20 13:21	1
Uranium-238	-1.07	U	0.786	0.797		1.03	pCi/g	11/04/20 13:46	12/02/20 13:21	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-025**

**Lab Sample ID: 160-40093-27**

Date Collected: 10/21/20 13:03  
Date Received: 10/26/20 08:38

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.278	U	0.425	0.427		0.288	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Actinium 228</b>	<b>0.486</b>		0.164	0.172		0.0342	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Bismuth-212	0.0465	U	0.766	0.766		0.626	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Bismuth-214</b>	<b>0.326</b>		0.123	0.128		0.0522	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Cesium-137	0.0273	U	0.0564	0.0565	0.0700	0.0433	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Lead-210	-0.169	U		1.32		1.09	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Lead-212</b>	<b>0.278</b>		0.0884	0.0954		0.0522	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Lead-214</b>	<b>0.379</b>		0.114	0.121		0.0419	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Potassium-40</b>	<b>7.36</b>		1.33	1.53		0.140	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Protactinium-231	0.000	U	0.817	0.817		2.13	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Protactinium-234	0.0851	U	0.232	0.232		0.187	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Radium-226</b>	<b>0.326</b>		0.123	0.128	0.200	0.0522	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Radium-228</b>	<b>0.486</b>		0.164	0.172		0.0342	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Thallium-208</b>	<b>0.140</b>		0.0690	0.0705		0.0296	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Thorium-232</b>	<b>0.486</b>		0.164	0.172		0.0342	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Thorium-234	-0.479	U		1.35		1.12	pCi/g	11/04/20 13:46	12/02/20 13:31	1
<b>Thorium 228</b>	<b>0.278</b>		0.0884	0.0954		0.0522	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Uranium-235	0.164	U	0.338	0.338		0.430	pCi/g	11/04/20 13:46	12/02/20 13:31	1
Uranium-238	-0.479	U		1.35		1.12	pCi/g	11/04/20 13:46	12/02/20 13:31	1

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

## Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A

Matrix: Solid

Analysis Batch: 490292

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 488460

Analyte	Result	MB	MB	Count		Total		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)						
Total Beta Strontium	-0.01989	U		0.0586		0.0586		0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<i>Carrier</i>		<i>MB</i>	<i>MB</i>										
Sr Carrier	86.4	%Yield	Qualifier	Limits									
				40 - 110									

Lab Sample ID: LCS 160-488460/1-A

Matrix: Solid

Analysis Batch: 490302

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total		LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert.	(2σ+/-)						
Total Beta Strontium	7.77	6.487		0.537		0.160	0.0549	pCi/g	83	75 - 125	
<i>Carrier</i>		<i>LCS</i>	<i>LCS</i>								
Sr Carrier	89.5	%Yield	Qualifier	Limits							
				40 - 110							

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488209/1-A

Matrix: Solid

Analysis Batch: 490647

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 488209

Analyte	Result	MB	MB	Count		Total		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)						
Actinium-227	0.01440	U		0.451		0.451		0.280	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Actinium 228	0.02805	U		0.199		0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-212	0.0000	U		0.189		0.189		0.383	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-214	0.01315	U		0.147		0.147		0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Cesium-137	-0.02984	U		0.0378		0.0379	0.0700	0.0533	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-210	1.586			1.34		1.36		0.890	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-212	0.009318	U		0.101		0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-214	0.01598	U		0.107		0.107		0.0856	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Potassium-40	-0.1967	U		0.997		0.997		0.304	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-231	0.0000	U		0.158		0.158		1.98	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-234	0.01447	U		0.0320		0.0320		0.216	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Radium-226	0.01315	U		0.147		0.147	0.200	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Radium-228	0.02805	U		0.199		0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thallium-208	-0.004688	U		0.00594		0.00596		0.0547	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-232	0.02805	U		0.199		0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-234	-0.5789	U		0.465		0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium 228	0.009318	U		0.101		0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-235	0.06692	U		0.212		0.212		0.348	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-238	-0.5789	U		0.465		0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	

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# QC Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40093-1  
 SDG: GJ46599781

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** LCS 160-488209/2-A  
**Matrix:** Solid  
**Analysis Batch:** 490648

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 488209

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.		Limits
		Result	Qual		LOQ	DLC	Unit	%Rec	
Americium-241	96.4	98.24		10.3		0.585	pCi/g	102	87 - 116
Cesium-137	26.7	26.94		2.91	0.0700	0.128	pCi/g	101	87 - 120
Cobalt-60	9.50	9.522		1.03		0.0428	pCi/g	100	87 - 115

**Lab Sample ID:** 160-40093-16 DU  
**Matrix:** Solid  
**Analysis Batch:** 490650

**Client Sample ID:** HPPG-SFU-TU098A-014  
**Prep Type:** Total/NA  
**Prep Batch:** 488209

Analyte	Sample	Sample	DU		Uncert. (2σ+/-)	Total				RER	Limit	
	Result	Qual	Result	Qual		LOQ	DLC	Unit	RER			
Actinium-227	-0.262	U			-0.2587	U	0.496		0.286	pCi/g	0	1
Actinium 228	0.364				0.3870		0.0965		0.0414	pCi/g	0.09	1
Bismuth-212	0.000	U			-0.1578	U	0.666		0.538	pCi/g	0.14	1
Bismuth-214	0.350				0.3596		0.0929		0.0306	pCi/g	0.05	1
Cesium-137	0.00855	U			-0.01413	U	0.0431	0.0700	0.0342	pCi/g	0.21	1
Lead-210	-0.732	U			-0.3444	U	0.973		0.782	pCi/g	0.16	1
Lead-212	0.427				0.3888		0.0817		0.0241	pCi/g	0.21	1
Lead-214	0.403				0.3988		0.0860		0.0301	pCi/g	0.02	1
Potassium-40	6.30				5.815		1.26		0.327	pCi/g	0.19	1
Protactinium-231	0.538	U			0.2472	U	0.972		1.53	pCi/g	0.11	1
Protactinium-234	-0.00195	U			-0.03009	U	0.0773		0.186	pCi/g	0.36	1
Radium-226	0.350				0.3596		0.0929	0.200	0.0306	pCi/g	0.05	1
Radium-228	0.364				0.3870		0.0965		0.0414	pCi/g	0.09	1
Thallium-208	0.141				0.1197		0.0390		0.0117	pCi/g	0.26	1
Thorium-232	0.364				0.3870		0.0965		0.0414	pCi/g	0.09	1
Thorium-234	0.537				0.1479	U	0.402		0.266	pCi/g	0.43	1
Thorium 228	0.427				0.3888		0.0817		0.0241	pCi/g	0.21	1
Uranium-235	0.104	U			0.03105	U	0.183		0.343	pCi/g	0.14	1
Uranium-238	0.537				0.1479	U	0.402		0.266	pCi/g	0.43	1

**Lab Sample ID:** MB 160-488229/1-A  
**Matrix:** Solid  
**Analysis Batch:** 490261

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 488229

Analyte	MB	MB	Count	Total		Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium-227	0.009307	U	0.0193	0.0193		0.451	pCi/g	11/04/20 17:38	11/25/20 17:48
Actinium 228	-0.03281	U	0.0424	0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48
Bismuth-212	0.0000	U	0.211	0.211		0.491	pCi/g	11/04/20 17:38	11/25/20 17:48
Bismuth-214	-0.1961	U	0.130	0.131		0.299	pCi/g	11/04/20 17:38	11/25/20 17:48
Cesium-137	-0.01941	U	0.0667	0.0667	0.0700	0.0572	pCi/g	11/04/20 17:38	11/25/20 17:48
Lead-210	0.3158	U	1.03	1.03		0.730	pCi/g	11/04/20 17:38	11/25/20 17:48
Lead-212	0.02194	U	0.124	0.124		0.100	pCi/g	11/04/20 17:38	11/25/20 17:48
Lead-214	-0.02104	U	0.105	0.106		0.0884	pCi/g	11/04/20 17:38	11/25/20 17:48
Potassium-40	-0.3910	U	1.27	1.27		0.629	pCi/g	11/04/20 17:38	11/25/20 17:48
Protactinium-231	0.0000	U	0.266	0.266		2.38	pCi/g	11/04/20 17:38	11/25/20 17:48
Protactinium-234	0.09066	U	0.244	0.244		0.115	pCi/g	11/04/20 17:38	11/25/20 17:48
Radium-226	-0.1961	U	0.130	0.131	0.200	0.299	pCi/g	11/04/20 17:38	11/25/20 17:48

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-488229/1-A

Matrix: Solid

Analysis Batch: 490261

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 488229

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Radium-228	-0.03281	U		0.0424		0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thallium-208	0.06514			0.0492		0.0497		0.0280	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium-232	-0.03281	U		0.0424		0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium-234	-0.3284	U		0.611		0.612		0.523	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium 228	0.02194	U		0.124		0.124		0.100	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Uranium-235	0.05125	U		0.114		0.114		0.231	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Uranium-238	-0.3284	U		0.611		0.612		0.523	pCi/g	11/04/20 17:38	11/25/20 17:48	1

Lab Sample ID: LCS 160-488229/2-A

Matrix: Solid

Analysis Batch: 490255

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 488229

Analyte	Spike Added	LCS Result	LCS Qual	Total			DLC	Unit	%Rec	Limits	%Rec.
				Uncert.	(2σ+/-)	LOQ					
Americium-241	96.4	101.1		10.6			0.453	pCi/g	105	87 - 116	
Cesium-137	26.8	25.32		2.69		0.0700	0.0777	pCi/g	95	87 - 120	
Cobalt-60	9.53	9.078		0.954			0.0437	pCi/g	95	87 - 115	

Lab Sample ID: 160-40093-15 DU

Matrix: Solid

Analysis Batch: 490257

Client Sample ID: HPPG-SFU-TU098A-013

Prep Type: Total/NA

Prep Batch: 488229

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total			DLC	Unit	RER	Limit
					Uncert.	(2σ+/-)	LOQ				
Actinium-227	0.210	U	-0.2270	U	0.568			0.376	pCi/g	0.38	1
Actinium 228	0.578		0.3969		0.165			0.0619	pCi/g	0.47	1
Bismuth-212	0.000	U	0.2986	U	0.589			0.450	pCi/g	0.37	1
Bismuth-214	0.0819	U	-0.1351	U	0.106			0.195	pCi/g	0.64	1
Cesium-137	0.0283	U	-0.01056	U	0.0557		0.0700	0.0448	pCi/g	0.32	1
Lead-210	1.46		0.5144	U	1.02			0.743	pCi/g	0.33	1
Lead-212	0.413		0.3686		0.0991			0.0443	pCi/g	0.20	1
Lead-214	0.416		0.5003		0.114			0.0434	pCi/g	0.35	1
Potassium-40	8.62		6.351		1.33			0.289	pCi/g	0.72	1
Protactinium-231	0.450	U	-0.7175	U	2.56			2.08	pCi/g	0.27	1
Protactinium-234	-0.133	U	0.06887	U	0.220			0.224	pCi/g	0.32	1
Radium-226	0.0819	U	-0.1351	U	0.106		0.200	0.195	pCi/g	0.64	1
Radium-228	0.578		0.3969		0.165			0.0619	pCi/g	0.47	1
Thallium-208	0.179		0.1739		0.0609			0.0224	pCi/g	0.04	1
Thorium-232	0.578		0.3969		0.165			0.0619	pCi/g	0.47	1
Thorium-234	-0.262	U	-1.048	U	0.526			0.873	pCi/g	0.45	1
Thorium 228	0.413		0.3686		0.0991			0.0443	pCi/g	0.20	1
Uranium-235	0.135	U	0.1499	U	0.411			0.420	pCi/g	0.01	1
Uranium-238	-0.262	U	-1.048	U	0.526			0.873	pCi/g	0.45	1

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

**Rad**

**Leach Batch: 487034**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-1	HPPG-F-013	Total/NA	Solid	Dry and Grind	
160-40093-2	HPPG-F-014	Total/NA	Solid	Dry and Grind	
160-40093-3	HPPG-SFU-TU098A-001	Total/NA	Solid	Dry and Grind	
160-40093-4	HPPG-SFU-TU098A-002	Total/NA	Solid	Dry and Grind	
160-40093-5	HPPG-SFU-TU098A-003	Total/NA	Solid	Dry and Grind	
160-40093-6	HPPG-SFU-TU098A-004	Total/NA	Solid	Dry and Grind	
160-40093-7	HPPG-SFU-TU098A-005	Total/NA	Solid	Dry and Grind	
160-40093-8	HPPG-SFU-TU098A-006	Total/NA	Solid	Dry and Grind	
160-40093-9	HPPG-SFU-TU098A-007	Total/NA	Solid	Dry and Grind	
160-40093-10	HPPG-SFU-TU098A-008	Total/NA	Solid	Dry and Grind	
160-40093-11	HPPG-SFU-TU098A-009	Total/NA	Solid	Dry and Grind	
160-40093-12	HPPG-SFU-TU098A-010	Total/NA	Solid	Dry and Grind	
160-40093-13	HPPG-SFU-TU098A-011	Total/NA	Solid	Dry and Grind	
160-40093-14	HPPG-SFU-TU098A-012	Total/NA	Solid	Dry and Grind	
160-40093-15	HPPG-SFU-TU098A-013	Total/NA	Solid	Dry and Grind	
160-40093-16	HPPG-SFU-TU098A-014	Total/NA	Solid	Dry and Grind	
160-40093-18	HPPG-SFU-TU098A-016	Total/NA	Solid	Dry and Grind	
160-40093-19	HPPG-SFU-TU098A-017	Total/NA	Solid	Dry and Grind	
160-40093-20	HPPG-SFU-TU098A-018	Total/NA	Solid	Dry and Grind	
160-40093-21	HPPG-SFU-TU098A-019	Total/NA	Solid	Dry and Grind	
160-40093-15 DU	HPPG-SFU-TU098A-013	Total/NA	Solid	Dry and Grind	
160-40093-16 DU	HPPG-SFU-TU098A-014	Total/NA	Solid	Dry and Grind	

**Leach Batch: 487040**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-22	HPPG-SFU-TU098A-020	Total/NA	Solid	Dry and Grind	
160-40093-23	HPPG-SFU-TU098A-021	Total/NA	Solid	Dry and Grind	
160-40093-24	HPPG-SFU-TU098A-022	Total/NA	Solid	Dry and Grind	
160-40093-25	HPPG-SFU-TU098A-023	Total/NA	Solid	Dry and Grind	
160-40093-26	HPPG-SFU-TU098A-024	Total/NA	Solid	Dry and Grind	
160-40093-27	HPPG-SFU-TU098A-025	Total/NA	Solid	Dry and Grind	

**Prep Batch: 488209**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-16	HPPG-SFU-TU098A-014	Total/NA	Solid	Fill_Geo-21	487034
160-40093-18	HPPG-SFU-TU098A-016	Total/NA	Solid	Fill_Geo-21	487034
160-40093-19	HPPG-SFU-TU098A-017	Total/NA	Solid	Fill_Geo-21	487034
160-40093-20	HPPG-SFU-TU098A-018	Total/NA	Solid	Fill_Geo-21	487034
160-40093-21	HPPG-SFU-TU098A-019	Total/NA	Solid	Fill_Geo-21	487034
160-40093-22	HPPG-SFU-TU098A-020	Total/NA	Solid	Fill_Geo-21	487040
160-40093-23	HPPG-SFU-TU098A-021	Total/NA	Solid	Fill_Geo-21	487040
160-40093-24	HPPG-SFU-TU098A-022	Total/NA	Solid	Fill_Geo-21	487040
160-40093-25	HPPG-SFU-TU098A-023	Total/NA	Solid	Fill_Geo-21	487040
160-40093-26	HPPG-SFU-TU098A-024	Total/NA	Solid	Fill_Geo-21	487040
160-40093-27	HPPG-SFU-TU098A-025	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488209/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488209/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40093-16 DU	HPPG-SFU-TU098A-014	Total/NA	Solid	Fill_Geo-21	487034

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

Rad

Prep Batch: 488229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-1	HPPG-F-013	Total/NA	Solid	Fill_Geo-21	487034
160-40093-2	HPPG-F-014	Total/NA	Solid	Fill_Geo-21	487034
160-40093-3	HPPG-SFU-TU098A-001	Total/NA	Solid	Fill_Geo-21	487034
160-40093-4	HPPG-SFU-TU098A-002	Total/NA	Solid	Fill_Geo-21	487034
160-40093-5	HPPG-SFU-TU098A-003	Total/NA	Solid	Fill_Geo-21	487034
160-40093-6	HPPG-SFU-TU098A-004	Total/NA	Solid	Fill_Geo-21	487034
160-40093-7	HPPG-SFU-TU098A-005	Total/NA	Solid	Fill_Geo-21	487034
160-40093-8	HPPG-SFU-TU098A-006	Total/NA	Solid	Fill_Geo-21	487034
160-40093-9	HPPG-SFU-TU098A-007	Total/NA	Solid	Fill_Geo-21	487034
160-40093-10	HPPG-SFU-TU098A-008	Total/NA	Solid	Fill_Geo-21	487034
160-40093-11	HPPG-SFU-TU098A-009	Total/NA	Solid	Fill_Geo-21	487034
160-40093-12	HPPG-SFU-TU098A-010	Total/NA	Solid	Fill_Geo-21	487034
160-40093-13	HPPG-SFU-TU098A-011	Total/NA	Solid	Fill_Geo-21	487034
160-40093-14	HPPG-SFU-TU098A-012	Total/NA	Solid	Fill_Geo-21	487034
160-40093-15	HPPG-SFU-TU098A-013	Total/NA	Solid	Fill_Geo-21	487034
MB 160-488229/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488229/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40093-15 DU	HPPG-SFU-TU098A-013	Total/NA	Solid	Fill_Geo-21	487034

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-3	HPPG-SFU-TU098A-001	Total/NA	Solid	DPS-0	487034
160-40093-13	HPPG-SFU-TU098A-011	Total/NA	Solid	DPS-0	487034
160-40093-23	HPPG-SFU-TU098A-021	Total/NA	Solid	DPS-0	487040
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-1  
SDG: GJ46599781

## Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr	(40-110)
160-40093-3	HPPG-SFU-TU098A-001	88.8	
160-40093-13	HPPG-SFU-TU098A-011	90.2	
160-40093-23	HPPG-SFU-TU098A-021	90.4	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

### Tracer/Carrier Legend

Sr = Sr Carrier

Eurofins TestAmerica, St. Louis



## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40093-2  
Laboratory Sample Delivery Group: GJ46599781  
Client Project/Site: HPNS-Parcel G 501197

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
1/11/2021 4:07:22 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

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The  
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[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

**Job ID: 160-40093-2**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

### CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40093-2**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

#### RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 15.1 C.

Sample HPPG-SFU-TU098A-015 (160-40093-17) was initially prepped in a 100 mL solid geometry due to insufficient volume. It was determined that the sample was able to be disaggregated and homogenized to fill a tuna can geometry. This sample is reported using a tuna can geometry with 21 days of ingrowth in job 160-40093-2.

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

### Job ID: 160-40093-2 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

##### **RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)**

Sample HPPG-SFU-TU098A-015 (160-40093-17) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 10/28/2020, prepared on 12/17/2020 and analyzed on 01/05/2021.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-492149 is within limits and is stored in the level IV raw data. (MB 160-492149/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.  
HPPG-SFU-TU098A-015 (160-40093-17).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197 Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action Project Location: San Francisco, CA Purchase Order #: 1159058 Shipment/Pickup Date: 10/22/2020 Waybill Number: 4957 0225 4384 Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046				Analysis Requested								
				Gamma Spec (EPA 801.1M) - Full 21 day ingrowth gamma	Strontium-90 (EPA 805 M02)				Dose Rate uR/Hr	Evidence Bag ID	Comment	
Lab Contact Name/ph # Rhaeda Ridenbower (314)298-8566												
Sample ID	Collection Information			Matrix	# of Containers	Preservatives (water)						
	Date	Time	Method			Preservatives (soil)						
						Container Type						
HPPG-F-013	10/21/2020	10:39	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-F-014	10/21/2020	12:38	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-001	10/21/2020	10:30	G	SO	1	16 oz. plastic jar	X	X		4	GJ46599781	
HPPG-SFU-TU098A-002	10/21/2020	10:34	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-003	10/21/2020	10:39	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-004	10/21/2020	10:43	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-005	10/21/2020	10:47	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-006	10/21/2020	11:01	G	SO	1	16 oz. plastic jar	X			4	GJ46599781	

## Special Instructions:

21 day ingrowth results only  
Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turnaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I <input type="checkbox"/>	II <input type="checkbox"/>	III <input type="checkbox"/>	Project Specific
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening									

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/21/2020 17:25	Locked Storage (RKilpack)		10/21/2020 17:25
Locked Storage (RKilpack)		10/22/2020 15:41	Devin Lewis		10/22/2020 15:41
Devin Lewis		10/22/2020 16:18	SHIPPED TO LAB VIA FE		10/26/2020 08:38

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



ED\_006360A\_00000356-00081



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-9769  
Address: 3005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197

Hunters Point Naval Shipyard, Parcel  
Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/22/2020

Waybill Number: 4457 0225 4384

Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #:

Rhoeda Ridenbower (314)298-8566

	Collection information				Matrix	# of Containers	Preservatives (water)		Storage-SO (EPA 905 MOC)	Gamma Spec (EPA 901.1 M) - Full 21 day In Ground Gamma	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method	Container Type			Preservatives (soil)						
HPPG-SFU-TU098A-007	10/21/2020	11:05	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-008	10/21/2020	11:09	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-009	10/21/2020	11:12	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-010	10/21/2020	11:14	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-011	10/21/2020	11:17	G	SO	1	1	16 oz. plastic jar	X	X		4	GJ46599781	
HPPG-SFU-TU098A-012	10/21/2020	11:22	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-013	10/21/2020	11:31	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-014	10/21/2020	11:39	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-015	10/21/2020	11:45	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-016	10/21/2020	11:51	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-017	10/21/2020	12:38	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-018	10/21/2020	12:43	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-019	10/21/2020	12:46	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-020	10/21/2020	12:48	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-021	10/21/2020	12:52	G	SO	1	1	16 oz. plastic jar	X	X		4	GJ46599781	
HPPG-SFU-TU098A-022	10/21/2020	12:55	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	
HPPG-SFU-TU098A-023	10/21/2020	12:59	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599781	





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-012

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

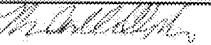
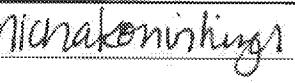
Lab Contact Name/ph #				Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment
				Sample Spec (EPA 9011 M)	Sample 90 (EPA 9011 M)	Day in Month/Year	Preservatives (water)			
Rhueda Ridenbower (314)298-8566										

Collection Information				Matrix	# of Containers	Preservatives (water)	Container Type			
Sample ID	Date	Time	Method				Preservatives (soil)			
HPPG-SFU-TU098A-024	10/21/2020	13:01	G	SO	1	16 oz. plastic jar	X			4
HPPG-SFU-TU098A-026	10/21/2020	13:03	G	SO	1	16 oz. plastic jar	X			4



# All Transfers for COC 501197RSY-012

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/21/2020 17:25	Locked Storage (RKillpack)		10/21/2020 17:25
Locked Storage (RKillpack)		10/22/2020 15:41	Devin Lewis		10/22/2020 15:41
Devin Lewis		10/22/2020 16:18	via <small>SHIPPEDTOLAB</small> e		10/26/2020 08:38

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40093-2

SDG Number: GJ46599781

**Login Number: 40093****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy  
None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40093-17	HPPG-SFU-TU098A-015	Solid	10/21/20 11:45	10/26/20 08:38	



Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

**Client Sample ID: HPPG-SFU-TU098A-015**  
Date Collected: 10/21/20 11:45  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40093-17**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.233	U	1.02	1.02		0.600	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Actinium 228</b>	<b>0.695</b>		0.257	0.267		0.0522	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Bismuth-212	0.000	U	0.752	0.752		0.965	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Bismuth-214</b>	<b>0.321</b>		0.170	0.173		0.0931	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Cesium-137	-0.0957	U	0.153	0.153	0.0700	0.120	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Lead-210	-1.39	U	1.18	1.19		1.81	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Lead-212</b>	<b>0.288</b>		0.137	0.142		0.0924	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Lead-214</b>	<b>0.455</b>		0.172	0.178		0.0770	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Potassium-40</b>	<b>10.6</b>		2.03	2.30		0.378	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Protactinium-231	0.000	U	0.735	0.735		3.11	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Protactinium-234	0.224	U	0.389	0.390		0.306	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Radium-226</b>	<b>0.321</b>		0.170	0.173	0.200	0.0931	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Radium-228</b>	<b>0.695</b>		0.257	0.267		0.0522	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Thallium-208</b>	<b>0.183</b>		0.136	0.137		0.0595	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Thorium-232</b>	<b>0.695</b>		0.257	0.267		0.0522	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Thorium-234	-1.19	U	1.04	1.05		1.61	pCi/g	12/17/20 09:57	01/05/21 06:04	1
<b>Thorium 228</b>	<b>0.288</b>		0.137	0.142		0.0924	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Uranium-235	0.0717	U	0.438	0.438		0.357	pCi/g	12/17/20 09:57	01/05/21 06:04	1
Uranium-238	-1.19	U	1.04	1.05		1.61	pCi/g	12/17/20 09:57	01/05/21 06:04	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-492149/1-A

Matrix: Solid

Analysis Batch: 493847

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 492149

Analyte	MB	MB	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.						
Actinium-227	0.01995	U		0.0543	0.0543		0.303	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Actinium 228	-0.2855	U		0.507	0.508		0.264	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Bismuth-212	-0.02905	U		0.953	0.953		0.781	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Bismuth-214	0.04066	U		0.0357	0.0360		0.183	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Cesium-137	-0.03699	U		0.102	0.103	0.0700	0.0682	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Lead-210	0.2434	U		1.22	1.22		0.872	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Lead-212	0.01177	U		0.0918	0.0918		0.0742	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Lead-214	-0.02946	U		0.114	0.115		0.0963	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Potassium-40	0.5469			0.611	0.614		0.329	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Protactinium-231	-1.076	U		3.91	3.91		3.18	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Protactinium-234	0.1085	U		0.0955	0.0962		0.171	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Radium-226	0.04066	U		0.0357	0.0360	0.200	0.183	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Radium-228	-0.2855	U		0.507	0.508		0.264	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Thallium-208	-0.02673	U		0.0459	0.0460		0.0593	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Thorium-232	-0.2855	U		0.507	0.508		0.264	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Thorium-234	-0.5904	U		0.663	0.667		0.641	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Thorium 228	0.01177	U		0.0918	0.0918		0.0742	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Uranium-235	0.06204	U		0.201	0.201		0.226	pCi/g	12/17/20 09:57	01/05/21 06:41	1
Uranium-238	-0.5904	U		0.663	0.667		0.641	pCi/g	12/17/20 09:57	01/05/21 06:41	1

Lab Sample ID: LCS 160-492149/2-A

Matrix: Solid

Analysis Batch: 493909

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 492149

Analyte	Spike	LCS	LCS	Total		LOQ	DLC	Unit	%Rec.	Limits
	Added	Result	Qual	Uncert.	(2σ+/-)					
Americium-241	96.4	98.61		10.3			0.512	pCi/g	102	87 - 116
Cesium-137	26.7	27.35		2.91		0.0700	0.0648	pCi/g	102	87 - 120
Cobalt-60	9.39	9.046		0.961			0.0457	pCi/g	96	87 - 115

Lab Sample ID: 160-40093-17 DU

Matrix: Solid

Analysis Batch: 493844

Client Sample ID: HPPG-SFU-TU098A-015

Prep Type: Total/NA

Prep Batch: 492149

Analyte	Sample	Sample	DU	DU	Total		LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	Uncert.	(2σ+/-)					
Actinium-227	-0.233	U		0.1938	U	0.493		0.386	pCi/g	0.28	1
Actinium 228	0.695			0.4339		0.203		0.0661	pCi/g	0.56	1
Bismuth-212	0.000	U		0.4021	U	0.708		0.527	pCi/g	0.28	1
Bismuth-214	0.321			0.1713		0.107		0.160	pCi/g	0.54	1
Cesium-137	-0.0957	U		-0.04918	U	0.0519	0.0700	0.0612	pCi/g	0.23	1
Lead-210	-1.39	U		-0.8289	U	2.13		1.78	pCi/g	0.17	1
Lead-212	0.288			0.5314		0.141		0.0616	pCi/g	0.86	1
Lead-214	0.455			0.4982		0.148		0.0634	pCi/g	0.13	1
Potassium-40	10.6			10.69		2.09		0.408	pCi/g	0.03	1
Protactinium-231	0.000	U		0.6726	U	3.00		2.45	pCi/g	0.18	1
Protactinium-234	0.224	U		0.03006	U	0.0779		0.317	pCi/g	0.41	1
Radium-226	0.321			0.1713		0.107	0.200	0.160	pCi/g	0.54	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40093-17 DU

Client Sample ID: HPPG-SFU-TU098A-015

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 493844

Prep Batch: 492149

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Radium-228	0.695		0.4339		0.203		0.0661	pCi/g	0.56	1
Thallium-208	0.183		0.09841		0.123		0.0552	pCi/g	0.33	1
Thorium-232	0.695		0.4339		0.203		0.0661	pCi/g	0.56	1
Thorium-234	-1.19	U	0.2008	U	0.778		0.624	pCi/g	0.76	1
Thorium 228	0.288		0.5314		0.141		0.0616	pCi/g	0.86	1
Uranium-235	0.0717	U	-0.07692	U	0.512		0.551	pCi/g	0.16	1
Uranium-238	-1.19	U	0.2008	U	0.778		0.624	pCi/g	0.76	1

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40093-2  
SDG: GJ46599781

Rad

Leach Batch: 487034

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-17	HPPG-SFU-TU098A-015	Total/NA	Solid	Dry and Grind	
160-40093-17 DU	HPPG-SFU-TU098A-015	Total/NA	Solid	Dry and Grind	

Prep Batch: 492149

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40093-17	HPPG-SFU-TU098A-015	Total/NA	Solid	Fill_Geo-21	487034
MB 160-492149/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-492149/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40093-17 DU	HPPG-SFU-TU098A-015	Total/NA	Solid	Fill_Geo-21	487034

Eurofins TestAmerica, St. Louis



## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40095-1  
Laboratory Sample Delivery Group: D1189473  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 2

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

*Authorized for release by:*  
4/13/2021 3:41:03 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

**Job ID: 160-40095-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40095-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Incorrect GFPC blue monthly background, correct background and results reported in revision.  
Revision 2- Additional information requested in case narrative for total strontium

# Case Narrative

Page 96 of 107

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

## Job ID: 160-40095-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 15.1 C.

#### TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-SFU-TU098A-B-001 (160-40095-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/28/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP.

:HPPG-SFU-TU098A-B-001 (160-40095-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU098A-B-001 (160-40095-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 10/28/2020, prepared on 11/04/2020 and analyzed on 12/02/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

#### Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-488209 is within limits and is stored in the level IV raw data. (MB 160-488209/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-014

Page 1 of 2

APTIM Federal Services, LLC

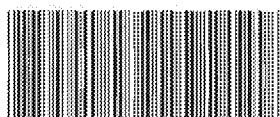
4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez

Project Number: 501197				Analysis Requested									
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action				Strontium-90 (EPA 905 M01)									
Project Location: San Francisco, CA				Cadmium Spec (EPA 901.1 M) - Full 121 day in ground sample									
Purchase Order #: 1159058				Dose Rate uR/Hr									
Shipment/Pickup Date: 10/22/2020				Evidence Bag ID									
Waybill Number: 4957 0225 4384				Comment									
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046													
Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566													
Collection Information				Preservatives (water)									
Sample ID	Date	Time	Method	Matrix	# of Containers	Preservatives (soil)		Container Type					
HPPG-SFU-TU098A-B-001	10/22/2020	08:57	G	SO	1	Preservatives (water)		16 oz. plastic jar		X	X	4	
Special Instructions: 21 day ingrowth results only Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g													
Turnaround Time: 3-day <input type="checkbox"/> 10-Day <input type="checkbox"/> 28-day <input type="checkbox"/> Other <input type="checkbox"/>				Level of QC Required: I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> Project Specific									
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening													
Relinquished By:		Relinquisher Signature:		Relinquish Date Time:		Received By:		Received Signature:		Receive Date Time:			
Lewis, Devin				10/22/2020 16:19		SHIPPEDTOLAB via FE				10/22/2020 08:38			

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



150-40095 Chain of Custody



**All Transfers for COC 501197RSY-014**

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/22/2020 16:19	SHIPPEDTOLAB		10/26/2020 08:38



ED\_006360A\_00000356-00098

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40095-1  
SDG Number: D1189473**Login Number: 40095****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

## Protocol References:

DOE = U.S. Department of Energy

None = None

## Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40095-1	HPPG-SFU-TU098A-B-001	Solid	10/22/20 08:57	10/26/20 08:38	

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

**Client Sample ID: HPPG-SFU-TU098A-B-001**

**Lab Sample ID: 160-40095-1**

Matrix: Solid

Date Collected: 10/22/20 08:57  
Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.111	U	0.0552	0.0558	0.160	0.0548	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	86.7		40 - 110					11/06/20 11:01	11/26/20 10:48	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.248	U	0.635	0.636		0.370	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Actinium 228</b>	<b>0.512</b>		0.139	0.149		0.0844	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Bismuth-212	0.000	U	0.440	0.440		0.466	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Bismuth-214</b>	<b>0.392</b>		0.100	0.108		0.0385	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Cesium-137	0.00178	U	0.0432	0.0432	0.0700	0.0354	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Lead-210	0.301	U	1.34	1.34		1.09	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Lead-212</b>	<b>0.472</b>		0.0799	0.101		0.0321	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Lead-214</b>	<b>0.482</b>		0.0819	0.0960		0.0368	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Potassium-40</b>	<b>7.82</b>		1.16	1.41		0.260	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Protactinium-231	-0.823	U	2.56	2.57		2.09	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Protactinium-234	0.126	U	0.220	0.220		0.176	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Radium-226</b>	<b>0.392</b>		0.100	0.108	0.200	0.0385	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Radium-228</b>	<b>0.512</b>		0.139	0.149		0.0844	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Thallium-208</b>	<b>0.196</b>		0.0617	0.0650		0.0226	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Thorium-232</b>	<b>0.512</b>		0.139	0.149		0.0844	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Thorium-234	-0.379	U	0.327	0.330		0.896	pCi/g	11/04/20 13:46	12/02/20 13:27	1
<b>Thorium 228</b>	<b>0.472</b>		0.0799	0.101		0.0321	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Uranium-235	0.103	U	0.208	0.208		0.167	pCi/g	11/04/20 13:46	12/02/20 13:27	1
Uranium-238	-0.379	U	0.327	0.330		0.896	pCi/g	11/04/20 13:46	12/02/20 13:27	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

## Method: 905.0 - Total Beta Strontium (GFPC)

**Lab Sample ID:** MB 160-488460/24-A

**Matrix:** Solid

**Analysis Batch:** 490292

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 488460

Analyte	Result	MB MB U	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<b>Carrier</b>			<b>MB MB %Yield</b>	<b>MB Qualifier</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier			86.4	Limits	40 - 110			11/06/20 11:01	11/26/20 10:48	1

**Lab Sample ID:** LCS 160-488460/1-A

**Matrix:** Solid

**Analysis Batch:** 490302

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium		7.77	6.487	0.537	0.160	0.0549	pCi/g	83	75 - 125	
<b>Carrier</b>			<b>LCS LCS %Yield</b>	<b>Qualifier</b>	<b>Limits</b>					
Sr Carrier			89.5		40 - 110					

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-488209/1-A

**Matrix:** Solid

**Analysis Batch:** 490647

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 488209

Analyte	Result	MB MB U	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.01440	U	0.451	0.451	0.280	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Actinium 228	0.02805	U	0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-212	0.0000	U	0.189	0.189	0.383	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-214	0.01315	U	0.147	0.147	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Cesium-137	-0.02984	U	0.0378	0.0379	0.0700	0.0533	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-210	1.586		1.34	1.36	0.890	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-212	0.009318	U	0.101	0.101	0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-214	0.01598	U	0.107	0.107	0.0856	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Potassium-40	-0.1967	U	0.997	0.997	0.304	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-231	0.0000	U	0.158	0.158	1.98	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-234	0.01447	U	0.0320	0.0320	0.216	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Radium-226	0.01315	U	0.147	0.147	0.200	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-228	0.02805	U	0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thallium-208	-0.004688	U	0.00594	0.00596	0.0547	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-232	0.02805	U	0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-234	-0.5789	U	0.465	0.470	0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium 228	0.009318	U	0.101	0.101	0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-235	0.06692	U	0.212	0.212	0.348	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-238	-0.5789	U	0.465	0.470	0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	

Eurofins TestAmerica, St. Louis

# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488209/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 490648

Prep Batch: 488209

Analyte	Spike Added	LCS		Total		DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)	LOQ				
Americium-241	96.4	98.24		10.3		0.585	pCi/g	102	87 - 116
Cesium-137	26.7	26.94		2.91	0.0700	0.128	pCi/g	101	87 - 120
Cobalt-60	9.50	9.522		1.03		0.0428	pCi/g	100	87 - 115

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

Rad

Leach Batch: 487040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40095-1	HPPG-SFU-TU098A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40095-1	HPPG-SFU-TU098A-B-001	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488209/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488209/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40095-1	HPPG-SFU-TU098A-B-001	Total/NA	Solid	DPS-0	487040
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40095-1  
SDG: D1189473

## Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr	(40-110)
160-40095-1	HPPG-SFU-TU098A-B-001	86.7	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

### Tracer/Carrier Legend

Sr = Sr Carrier

Eurofins TestAmerica, St. Louis